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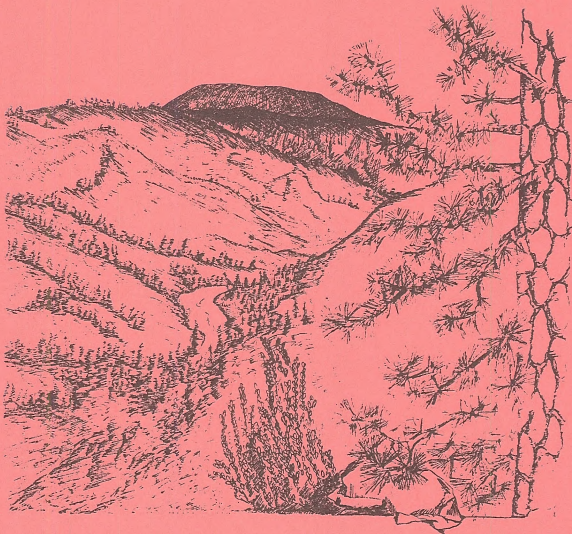
Klamath Falls Resource Area  
2795 Anderson Avenue, Bldg. 25  
Klamath Falls, Oregon 97603

September 1994



# **Klamath Falls Resource Area Resource Management Plan and Environmental Impact Statement**

**Volume I**



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

Klamath Falls Resource Area Office  
Lakeview District Office

In Reply Refer to:

1617 (933)

September 1994

Dear Public Land User:

Enclosed for your review and comment is the Klamath Falls Resource Area Proposed Resource Management Plan/Final Environmental Impact Statement for the Lakeview District, Oregon. The Bureau of Land Management has prepared this document in partial fulfillment of its responsibilities under the Federal Land Policy and Management Act of 1976 and the National Environmental Policy Act of 1969.

The Proposed Resource Management Plan/Final Environmental Impact Statement is designed to stand alone from the draft Resource Management Plan/Environmental Impact Statement which was published in August 1992. However, you may find the draft Resource Management Plan/Environmental Impact Statement to be a useful reference document.

The public devoted substantial effort to providing in-depth input on the draft Resource Management Plan/Environmental Impact Statement. The Klamath Falls Resource Area received approximately 1,000 individual comment letters containing over 450 specific comments. The Planning Team has assessed these comments and utilized the input in making substantive changes in the Proposed Resource Management Plan and strengthening the Environmental Impact Statement. We sincerely appreciate the efforts of those who took the time to provide us with their comments. We feel that your efforts have resulted in a stronger and clearer Resource Management Plan.

This Proposed Resource Management Plan/Final Environmental Impact Statement contains a summary comparison of the alternatives analyzed in depth, an introduction, a description of the Proposed Plan and other alternatives analyzed, an affected environment description, the environmental consequences of the Proposed Plan and other alternatives, substantive (more than opinion) public comments received on the draft Resource Management Plan/Environmental Impact Statement, and our response to those comments. The Preferred Alternative in the draft Resource Management Plan has been revised as a result of public comment, internal review, and the decisions made by the Secretaries of Interior and Agriculture following completion of the *Supplemental Environmental Impact Statement on Management of Habitat for Species Within the Range of the Northern Spotted Owl*. This revision has become the Proposed Plan which reflects these changes in the refinement of management objectives and in management actions.

If you desire assistance in understanding this document or wish to schedule a briefing/meeting, you may contact the Resource Area Office at (503) 883-6916. Briefings/meetings to discuss and explain the proposed plan are currently being scheduled.

If you would like me to further consider your interests/concerns as I make the final decisions which will guide the management of the public lands in the planning area for the next 10-15 years, please identify them in writing during the protest and comment period, which ends 30 days after the Environmental Protection Agency publishes its Notice of Availability in the Federal Register. Comments should be sent to:

Charles Graham  
Bureau of Land Management  
Lakeview District Office  
1000 South 9th Street  
Lakeview, Oregon 97630

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The final decisions will be based on the analysis in the Environmental Impact Statement, any additional data available, public input, management feasibility, policy, and legal constraints. Approval of the plan will be documented in a record of decision which will be made available to the public and mailed to all parties who were mailed this document. It is also important to note that resource management plan implementation usually involves further analysis and decisionmaking, including public involvement and allows for protest of adverse decisions under 43 CFR Parts 4, 4100, and 5000.

The resource management planning process includes an opportunity for administrative review via a plan protest to the BLM Director if you believe the approval of a proposed resource management plan would be in error under 43 CFR 1610.5-2. Careful adherence to these guidelines will assist in preparing a protest that will assure the greatest consideration to your point of view.

Only those persons or organizations who participated in our planning process leading to this proposed resource management plan may protest. If our records do not indicate that you had any involvement in any stage in the preparation of the proposed Klamath Falls Resource Area Resource Management Plan, your protest will be dismissed without further review. A protest must also be limited to a single proposed resource management plan, even if the issue or concern involves more than one proposed resource management plan. Protests that challenge proposed decisions in more than one proposed resource management plan will not be accepted by the Director. In effect, if you may be adversely affected by more than one resource management plan, you must file an individual protest for each resource management plan citing why and where that particular resource management plan is incorrect or not in compliance with existing laws, regulations, etc.

Protests of proposed plan elements that merely adopt decisions made in the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* signed by the Secretary of the Interior will be dismissed, as the Director will not overturn a decision which the Secretary has already directed to be adopted in BLM's new resource management plans.

After this Proposed Management Plan/Final Environmental Impact Statement went to press, the Secretary of Interior designated 11 miles (referred to in the Proposed Resource Management Plan as segment 2) of the upper Klamath River as part of the National Wild and Scenic Rivers System under Section 2(a)(ii) of the Wild and Scenic Rivers Act. Thus, protests of the plan's finding of suitability for that segment of the river will also be dismissed, inasmuch as the Secretary has already made a designation.

A protesting party may raise only those issues which he or she submitted for the record during the planning process. New issues identified during the protest period should be directed to the District Manager for consideration during plan implementation, as potential plan amendments, or as otherwise appropriate. If an issue is shared by several individuals or landowners or interest groups, a combined protest on the common neighborhood issue or concern may be mutually more efficient and effective. For example, several landowners in a portion of the planning area may wish to combine their concerns on a proposed land allocation or management issue that affects their common interests in a given watershed.

The period for filing a plan protest begins when the Environmental Protection Agency publishes in the Federal Register its Notice of Availability of the final environmental impact statement concerning the proposed resource management plan or amendment. The protest and comment period will end 30 days after the Environmental Protection Agency publishes its Notice of Availability in the Federal Register. There is no provision in BLM's regulations for any extension of time, and no extensions for filing protests will be granted. To be considered "timely," your protest must be postmarked no later than the last day of the protest period. Also, although not a requirement, we suggest that you send your protest by certified mail, return receipt requested.

Protests must be filed in writing to:

Director (760)  
Chief, Planning and Environmental Coordination  
Bureau of Land Management  
1849 "C" Street Northwest  
Washington, D.C. 20240

To be considered complete, your protest must contain, at a minimum, the following information:

1. The name, mailing address, telephone number, and interest of the person filing the protest.
2. A statement of the issue or issues being protested.
3. A statement of the part or parts of the specific (named) proposed resource management plan being protested. To the extent possible, this should be done by reference to specific pages, paragraphs, sections, tables, maps, etc. included in the document.
4. A copy of all documents addressing the issue or issues that you submitted during the planning process or a reference to the date the issue or issues were discussed by you for the record.
5. A concise statement explaining why the BLM State Director's decision is believed to be incorrect. This is a critical part of your protest. Document all relevant facts. As much as possible, reference or cite the planning documents, environmental analysis documents, and available planning records (for example, meeting minutes or summaries, or correspondence). A protest which merely expresses disagreement with the Oregon/Washington State Director's proposed decision, without any data, will not provide us with the benefit of your information and insight. In this case, the Director's review will be based on the existing analysis and supporting data.

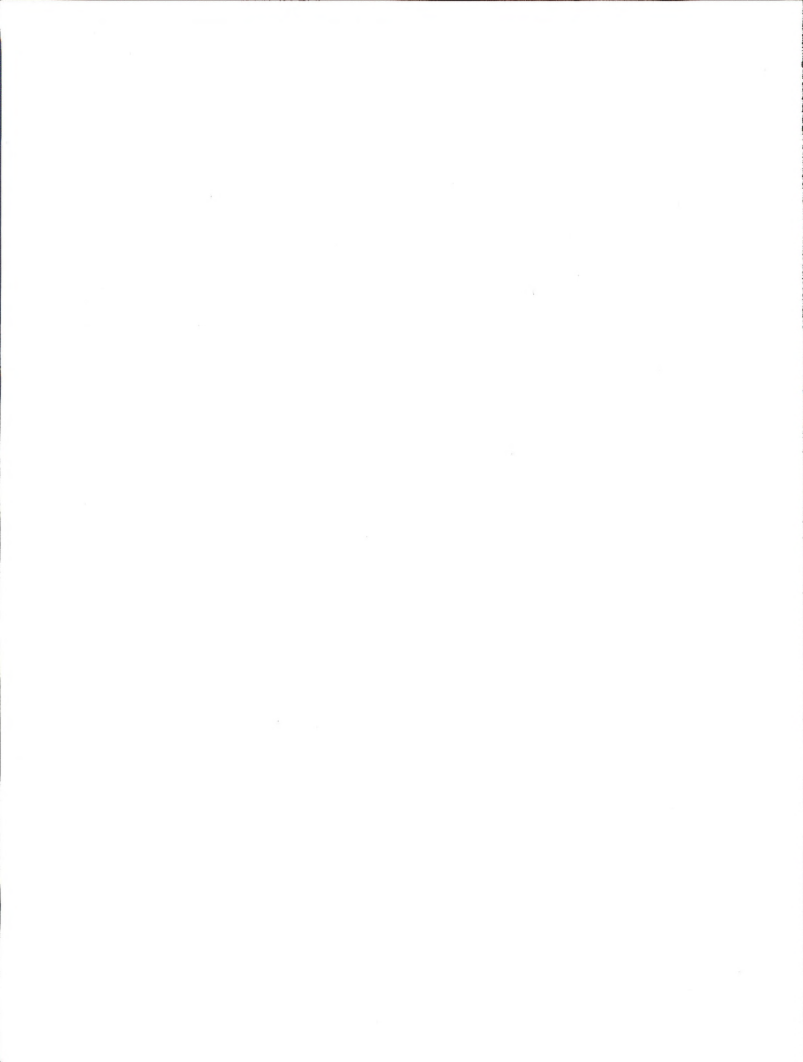
Before deciding to file a protest, I encourage you to contact me or A. Barron Bail to determine if your concerns might be met in some way other than via a protest or to assist you in the protest process if it is appropriate. Thank you for your continued interest in the multiple use management of your public lands.

Sincerely,

A handwritten signature in dark ink, appearing to read "Charles Graham", written in a cursive style.

Charles Graham  
District Manager





**U.S. Department of the Interior**  
**Bureau of Land Management**

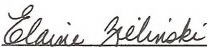
**Proposed Resource Management Plan/  
Final Environmental Impact Statement**

for the

**Klamath Falls Resource Area**

Prepared by

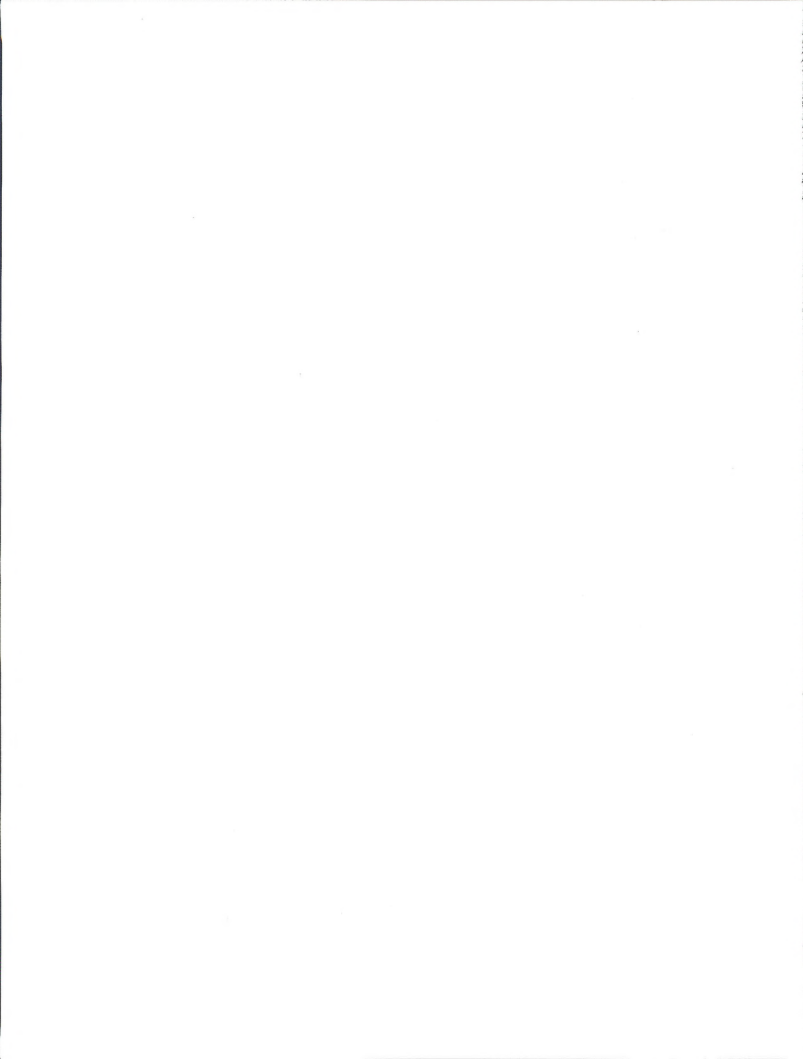
Klamath Falls Resource Area Office  
Lakeview District  
September 1994



Elaine Zielinski  
Elaine Zielinski  
State Director, Oregon/Washington



Charles Graham  
Charles Graham  
District Manager, Lakeview District



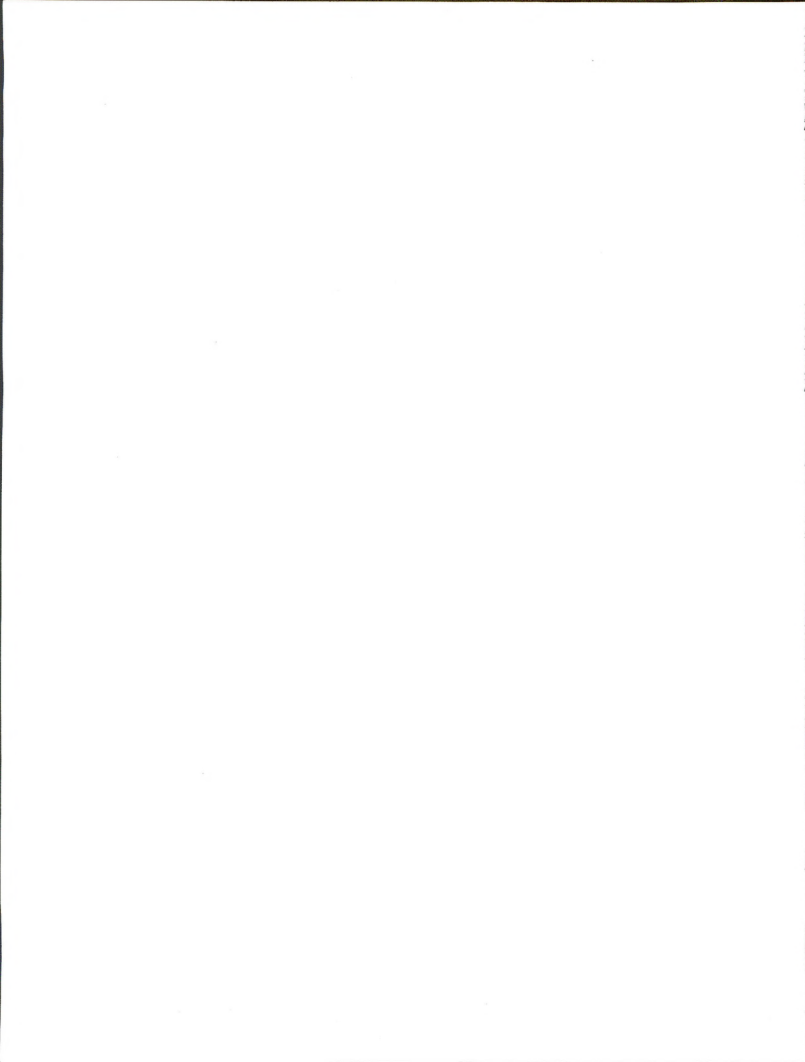


# **Resource Management Plan and Environmental Impact Statement**

**Draft ( ) Final (X)  
Department of the Interior  
Bureau of Land Management**

1. Type of Action: Administrative (X) Legislative ( ).
2. Abstract: This Final Resource Management Plan/Environmental Impact Statement addresses resource management on 212,000 acres of federal land and 21,000 acres of reserved mineral estate administered by the Bureau of Land Management in its Klamath Falls Resource Area of the Lakeview District. The Proposed Resource Management Plan responds to the need for healthy ecosystems, with habitat that will support populations of native species (including those associated with late-successional and old growth forests). It also responds to the need for a sustainable supply of timber, other forest and natural products, and live-stock and wildlife forage that will help maintain the stability of local and regional economies. It will also contribute valuable resources to the national economy on a predictable and long-term basis. The BLM-administered lands are allocated to Riparian Reserves, Late-Successional/District Designated Reserves, and Matrix (general forest management area). The Matrix will provide connectivity and diversity across the landscape. An Aquatic Conservation Strategy would be applied to the lands and waters under BLM jurisdiction in the Klamath Falls Resource Area. Four areas would be designated areas of critical environmental concern, one stretch of river would be found suitable, as scenic, for designation under the Wild and Scenic Rivers Act.
3. The protest and comment period will end 30 days after the Environmental Protection Agency publishes its Notice of Availability in the Federal Register.
4. For further information contact:

A. Barron Ball  
Area Manager  
Bureau of Land Management  
Klamath Falls Resource Area  
2795 Anderson Avenue, Bldg. 25  
Klamath Falls, OR 97603  
(503) 883-6916



# User's Guide

This User's Guide is meant to assist the reader in using the resource management plan/environmental impact statement. This resource management plan/environmental impact statement is divided into six chapters and several appendices. The sixth chapter contains miscellaneous material, such as the glossary and references. Other miscellaneous material in the document includes an abstract, list of acronyms, and summary. In addition, the table of contents includes a list of tables, maps, and figures for both the text and the appendices. The resource management plan/environmental impact statement is a multi-volume document, with the text and miscellaneous materials in one volume and the appendices in the others. There is also a separately bound volume with all of the maps in it. Having the maps bound separately should allow the reader to study the relevant map alongside the text.

The Summary presents a synopsis of the resource management plan/environmental impact statement (called hereafter the Proposed Resource Management Plan). It summarizes all alternatives, but includes more detail for the Proposed Resource Management Plan. Land use allocations for all issues are summarized. It also includes a summary of the environmental consequences and brief descriptions of monitoring, consistency with other government entities, and public involvement.

The list of acronyms follows the table of contents, which follows this User's Guide, to make it easier to find. A miniature table of contents is provided at the beginning of each chapter to help guide the reader through the chapter. Each chapter now starts with a summary of the major changes that occurred between draft and final preparation. Based on reader comments the use of acronyms was kept to a minimum in this document.

Chapter 1 is the Introduction to the document. This chapter includes a description of the planning area and the purpose and need for preparing this document. It also includes a discussion of the Proposed Resource Management Plan's relationship to BLM policies, programs, and other plans and describes the planning process and planning criteria. Finally, it identifies the issues and concerns addressed in the Proposed Resource Management Plan.

Chapter 2 is a description of the Proposed Resource Management Plan and alternatives. The chapter has four main sections; the Proposed Resource Management Plan, management direction for Alternatives A through E, management direction by alternative (except the Proposed Resource Management Plan), and other management directions. The first section is particularly important to understanding how lands would be managed under the Proposed Resource Management Plan. The next sections describe the management direction for each of the other six alternatives (Alternatives No Action, A, B, C, D, and E). The alternatives provide a mix of uses and actions that respond to, or resolve, the 12 issues identified in chapter 1. In between the Proposed Resource Management Plan and the other alternatives is Table 2-1 (and Table 2-13), which is a tabular summary of the alternatives so they can be compared. Maps displaying the major land use allocations are located in the map packet.

Chapter 3 (Affected Environment) describes the existing environment that could be affected or changed by implementing the Proposed Resource Management Plan or any of the other alternatives. This chapter includes a description of the resource values, such as water resources, vegetation, wildlife habitat, visual resources, etc.; and major land uses, such as recreation, timber, etc., related to the issues identified in Chapter 1.

Chapter 4 (Environmental Consequences) describes potential effects on the resources and land uses (or affected environment as described in Chapter 3) if the Proposed Resource Management Plan or any of the other alternatives were implemented. Some of the sections are internally organized by alternative, others by impactor (such as the effect of timber management or livestock grazing on water quality in the Effects on Water Resources section), and others by element of the particular resource (such as compaction/displacement and soil erosion in the Effects on Soil Resources section, or effects on big game or golden eagle in the Effects on Wildlife section). Whenever possible, a summary paragraph was included for each section. The chapter concludes with an overview of the consistency of each alternative with plans and programs of other government agencies.



Chapter 5 lists the agencies and organizations that the BLM has worked with during the preparation of the Resource Management Plan/Environmental Impact Statement preparation process. A list of the Resource Management Plan/Environmental Impact Statement team, other preparers and reviewers, other contributors, and former contributors is also included in the chapter.

Chapter 6 contains the references cited, glossary, and index.

The second volume contains appendices. Most of the appendices are fairly technical and are not meant for the lay person, but rather to provide supporting documentation for specialists.

Further questions or information on this document can be answered or obtained at the Klamath Falls Resource Area office during regular business hours.

# Table of Contents

## Chapter One - Introduction

Introduction .....	1-3
The Planning Area .....	1-3
Purpose and Need for the Action .....	1-3
Relationship of the .....	1-5
Resource Management Plan to BLM Policies, Programs, and Other Plans .....	1-5
Planning Process and Criteria .....	1-6
Issues .....	1-6
Western Oregon Digital Database .....	1-7
Issues, Concerns, and Other Planning .....	1-7
Considerations Eliminated from Detailed Study .....	1-7
Western Oregon Digital Database .....	1-7
Subsequent Chapters .....	1-8

## Chapter Two - Description of the Alternatives

Major Changes from Chapter 2 of the Draft Resource Management Plan .....	2-2
Introduction .....	2-2
The Proposed Resource Management Plan .....	2-2
Vision .....	2-2
Strategy .....	2-3
Ecological Principles for Management of Late- Successional Forests .....	2-3
Aquatic Conservation Strategy .....	2-4
Riparian Reserves .....	2-4
Key Watersheds .....	2-4
Watershed Analysis .....	2-5
Watershed Restoration .....	2-5
Land Use Allocations and Resource Programs .....	2-6
Management Actions/Direction for All Land Use Allocations and Resource Programs .....	2-6
Specific Land Use Allocations .....	2-8
Riparian Reserves .....	2-8
Late-Successional/District Designated Reserves .....	2-14
Matrix (General Forest Management Area) - West Side .....	2-18
Matrix (Late-Successional/District Designated Reserve Buffers .....	2-20
Matrix (General Forest Management Area) - East Side .....	2-22
Resource Programs .....	2-23
Air Quality .....	2-24
Water and Soils .....	2-24
Wildlife Habitat .....	2-27
Fish Habitat .....	2-32
Special Status and Supplemental Environmental Impact Statement Special	
Attention Species Habitat .....	2-33
Special Areas .....	2-37
Cultural Resources Including American Indian Values .....	2-39
Visual Resources .....	2-40
Wild and Scenic Rivers .....	2-41
Wilderness and Wilderness Study Areas .....	2-42

Rural Interface Areas .....	2-42
Socioeconomic Conditions .....	2-43
Recreation .....	2-44
Forest Condition Restoration (Forest Health Restoration) .....	2-49
Timber Resources .....	2-51
Special Forest/Natural Products .....	2-53
Energy and Minerals .....	2-55
Grazing Management .....	2-58
Wild Horse Management .....	2-59
Land Tenure Adjustments .....	2-60
Rights-of-Way .....	2-61
Access .....	2-63
Withdrawals .....	2-63
Roads .....	2-64
Noxious Weeds .....	2-68
Hazardous Material .....	2-69
Fire/Fuels Management .....	2-70
Management Direction Common to Alternatives A through E .....	2-118
Water Quality and Riparian Zones .....	2-118
Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity .....	2-121
Special Status (Including Threatened and Endangered) Species Habitats .....	2-125
Wildlife Habitats .....	2-126
Special Areas .....	2-128
Recreation .....	2-128
Wild and Scenic Rivers .....	2-129
Wilderness Study Areas .....	2-129
Visual Resources .....	2-130
Cultural Resources .....	2-130
Land Tenure .....	2-131
Hydroelectric or Alternative Energy Projects .....	2-132
Rights-of-Way .....	2-132
Access .....	2-133
Withdrawals .....	2-133
Energy and Minerals .....	2-133
Rural Interface Areas .....	2-134
Livestock Grazing .....	2-134
Wild Horses .....	2-135
Roads .....	2-135
Noxious Weed Control .....	2-136
Hazardous Materials .....	2-136
Fire .....	2-136
Management Direction for the Alternative No Action .....	2-137
Objective .....	2-137
Water Quality and Riparian Zones .....	2-137
Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity .....	2-138
Timber .....	2-138
Special Status (Including Threatened and Endangered) Species Habitats .....	2-139
Wildlife Habitats .....	2-139
Special Areas .....	2-140
Recreation .....	2-140



Wild and Scenic Rivers .....	2-141
Wilderness Study Areas .....	2-141
Visual Resources .....	2-141
Cultural Resources .....	2-141
Land Tenure .....	2-141
Hydroelectric and Alternative Energy Projects .....	2-142
Rights-of-Way .....	2-142
Access .....	2-142
Withdrawal Review .....	2-142
Energy And Minerals .....	2-142
Rural Interface Areas .....	2-142
Livestock Grazing .....	2-142
Wild Horses .....	2-143
Roads .....	2-143
Noxious Weed Control .....	2-143
Hazardous Materials .....	2-143
Fire .....	2-143
Management Direction for Alternative A .....	2-143
Objective .....	2-143
Water Quality and Riparian Zones .....	2-143
Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity .....	2-143
Timber .....	2-143
Special Status (Including Threatened and Endangered) Species Habitats .....	2-144
Wildlife Habitats .....	2-144
Special Areas .....	2-144
Recreation .....	2-145
Wild and Scenic Rivers .....	2-145
Wilderness Study Areas .....	2-145
Visual Resources .....	2-145
Cultural Resources .....	2-145
Land Tenure .....	2-145
Hydroelectric or Alternative Energy Projects .....	2-146
Rights-of-Way .....	2-146
Access .....	2-146
Withdrawals .....	2-146
Energy and Minerals .....	2-146
Rural Interface Areas .....	2-146
Livestock Grazing .....	2-146
Wild Horses .....	2-146
Roads .....	2-146
Noxious Weed Control .....	2-146
Hazardous Materials .....	2-147
Fire .....	2-147
Management Direction for Alternative B .....	2-147
Objective .....	2-147
Water Quality and Riparian Zones .....	2-147
Retention, Maintenance and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity .....	2-147
Timber .....	2-148
Special Status (Including Threatened and Endangered) Species Habitats .....	2-148
Wildlife Habitats .....	2-149

Special Areas .....	2-149
Recreation .....	2-149
Wild and Scenic Rivers .....	2-149
Wilderness Study Areas .....	2-149
Visual Resources .....	2-149
Cultural Resources .....	2-150
Land Tenure .....	2-150
Hydroelectric or Alternative Energy Projects .....	2-150
Rights-of-Way .....	2-150
Access .....	2-150
Withdrawals .....	2-150
Energy and Minerals .....	2-151
Rural Interface Areas .....	2-151
Livestock Grazing .....	2-151
Wild Horses .....	2-151
Roads .....	2-151
Noxious Weed Control .....	2-151
Hazardous Materials .....	2-151
Fire .....	2-151
Management Direction for Alternative C .....	2-152
Objective .....	2-152
Water Quality and Riparian Zones .....	2-152
Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity .....	2-152
Timber .....	2-153
Special Status (Including Threatened and Endangered) Species Habitats .....	2-155
Wildlife Habitats .....	2-155
Special Areas .....	2-156
Recreation .....	2-156
Wild and Scenic Rivers .....	2-157
Wilderness Study Areas .....	2-157
Visual Resources .....	2-157
Cultural Resources .....	2-157
Land Tenure .....	2-158
Hydroelectric or Alternative Energy Projects .....	2-158
Rights-of-Way .....	2-158
Access .....	2-158
Withdrawals .....	2-158
Energy and Minerals .....	2-159
Rural Interface Areas .....	2-159
Livestock Grazing .....	2-159
Wild Horses .....	2-159
Roads .....	2-159
Noxious Weed Control .....	2-159
Hazardous Materials .....	2-159
Fire .....	2-159
Management Direction for Alternative D .....	2-160
Objective .....	2-160
Water Quality and Riparian Zones .....	2-160
Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity .....	2-160
Timber .....	2-160

Special Status (Including Threatened and Endangered) Species Habitats .....	2-161
Wildlife Habitats .....	2-161
Special Areas .....	2-162
Recreation .....	2-162
Wild and Scenic Rivers .....	2-163
Wilderness Study Areas .....	2-163
Visual Resources .....	2-163
Cultural Resources .....	2-164
Land Tenure .....	2-164
Hydroelectric and Alternative Energy Projects .....	2-164
Rights-of-Way .....	2-164
Access .....	2-164
Withdrawals .....	2-164
Energy and Minerals .....	2-165
Rural Interface Areas .....	2-165
Livestock Grazing .....	2-165
Wild Horses .....	2-165
Roads .....	2-165
Noxious Weed Control .....	2-165
Hazardous Materials .....	2-165
Fire .....	2-165
Management Direction for Alternative E .....	2-166
Objective .....	2-166
Water Quality and Riparian Zones .....	2-166
Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity .....	2-166
Timber .....	2-167
Special Status (Including Threatened and Endangered) Species Habitats .....	2-167
Wildlife Habitats .....	2-167
Special Areas .....	2-167
Recreation .....	2-168
Wild and Scenic Rivers .....	2-169
Wilderness Study Areas .....	2-169
Visual Resources .....	2-169
Cultural Resources .....	2-170
Land Tenure .....	2-170
Hydroelectric and Alternative Energy Projects .....	2-170
Rights-of-Way .....	2-170
Access .....	2-170
Withdrawals .....	2-170
Energy and Minerals .....	2-170
Rural Interface Areas .....	2-171
Livestock Grazing .....	2-171
Wild Horses .....	2-171
Roads .....	2-171
Noxious Weeds .....	2-171
Hazardous Materials .....	2-171
Fire .....	2-171
Coordination and Consultation .....	2-172
Use of the Completed Plan .....	2-172
Adaptive Management .....	2-173
Watershed Analysis .....	2-175

Requirement for Further Environmental Analysis .....	2-177
Management of Newly Acquired Lands .....	2-178
Costs of Management .....	2-178
The Budget Link .....	2-179
Monitoring .....	2-179
Research .....	2-180

## Chapter 3 - Affected Environment

Major Changes From Chapter 3 of the Draft Resource Management Plan .....	3-3
Introduction .....	3-3
Climate .....	3-3
Topography and Geology .....	3-3
Lands .....	3-4
Air Resources .....	3-5
Soil Resources .....	3-10
Water Resources .....	3-11
Watershed Conditions .....	3-12
Analytical Watersheds .....	3-12
Key Watersheds .....	3-15
Watershed Analysis .....	3-15
Groundwater .....	3-16
Surface Water Quality .....	3-20
Biological Diversity .....	3-21
Vegetation .....	3-25
Riparian-Wetland Resources .....	3-31
Wildlife .....	3-37
Fish .....	3-41
Special Status and Supplemental Environmental Impact Statement Special	
Attention Species Habitat .....	3-41
Special Status Plants .....	3-42
Supplemental Environmental Impact Statement Special Attention Plant Species .....	3-42
Special Status Animals .....	3-44
Supplemental Environmental Impact Statement Special Attention Animal Species .....	3-47
Special Areas .....	3-48
Cultural Resources .....	3-48
Visual Resources .....	3-50
Wild and Scenic Rivers .....	3-50
Wilderness .....	3-52
Recreation .....	3-52
Timber Resources .....	3-58
Ecosystem Health .....	3-63
Forest Health .....	3-63
Range Health .....	3-66
Energy and Mineral Resources .....	3-67
Socioeconomic Conditions .....	3-68
Local Economic Activities .....	3-68
BLM Economic Contribution .....	3-73
Community Stability .....	3-75
Rural Interface Areas .....	3-76
Livestock Grazing .....	3-76
Wild Horses .....	3-78
Fire .....	3-79

## Chapter 4 - Environmental Consequences

Major Changes from Chapter 4 of the Draft Resource Management Plan .....	4-3
Introduction .....	4-3
Analytical Models .....	4-4
Sensitivity Analysis .....	4-4
Assumptions .....	4-4
Probable Sale Quantity .....	4-5
Ten-Year Representative Timber Management Scenarios .....	4-5
Ten-Year Development Scenarios .....	4-6
Mitigation .....	4-6
Effects of Alternatives .....	4-7
Effects on Global Climate .....	4-7
Effects on Air Quality .....	4-8
Effects on Soil Resources .....	4-11
Effects on Water Resources .....	4-16
Effects on Biological Diversity .....	4-24
Effects on Ecosystem Health .....	4-32
Effects on Vegetation .....	4-35
Effects on Riparian-Wetland Areas .....	4-40
Effects on Wildlife .....	4-44
Effects on Special Status and Supplemental Environmental Impact Statement	
Special Attention Species .....	4-67
Introduction .....	4-67
Plants .....	4-67
Animals .....	4-70
Effects on Fish .....	4-89
Effects on Special Areas .....	4-91
Effects on Cultural Resources Including American Indian Values .....	4-93
Effects on Visual Resources .....	4-97
Effects on Wild and Scenic Rivers .....	4-100
Effects on Wilderness .....	4-103
Effects on Recreation .....	4-104
Effects on Timber Production .....	4-109
Effects on Exploration and Development of Energy and Mineral Resources .....	4-118
Effects on Socioeconomic Conditions .....	4-120
Effects on Rural Interface Areas .....	4-132
Effects on Livestock Grazing .....	4-135
Effects on Wild Horses .....	4-137
Effects on Wildfire .....	4-139
Consistency with Other Agency Plans and Programs .....	4-141
Federal Agencies .....	4-141
State Agencies .....	4-141
Local Agencies .....	4-143
Other Agencies .....	4-143

## Chapter 5 - Consultation and Coordination

Introduction .....	5-3
Protest Process .....	5-3
Summary of Comments .....	5-4
List of Agencies and Organizations Contacted and to Whom Copies of the Proposed	
Resource Management Plan/Final Environmental Impact Statement Have Been Sent...	5-4



Federal Agencies .....	5-4
Oregon State Agencies .....	5-4
California State Agencies .....	5-5
Local Government and Other Government Bodies .....	5-5
Native American Organizations .....	5-5
Federal and State Elected Representatives .....	5-5
Interested Groups, Businesses, and Others .....	5-5
Preparers .....	5-9

## Chapter 6 - Glossary, References Cited, and Index

Glossary .....	6-1
References Cited .....	6-20
Index 6-39	

## Tables

2-1. Comparison of Allocations and Management by Alternatives .....	74
2-2. Habitat Enhancement Opportunities .....	28
2-3. Special Area Allocations .....	38
2-4. Visual Resource Management Classes by Acres .....	40
2-5. Recreation Allocations .....	45
2-6. Matrix Timber Allocations .....	52
2-7. Special Forest/Natural Products .....	54
2-8. Locatable Mineral Restrictions (acres) .....	56
2-9. Oil and Gas and Geothermal Lease Restrictions (acres) .....	56
2-10. Locatable Mineral Restrictions (acres) .....	56
2-11. Right-of-Way Avoidance Areas .....	62
2-12. Communication Sites .....	65
2-13. Withdrawals .....	107
2-14. Management Direction For Land Returning To BLM Administration .....	66
2-15. Noxious Weed Species Subject to Control in Klamath County .....	69
3-1. Current Inventory of BLM-Controlled Roads .....	3-6
3-2. Past Consumption and Pollutant Emissions in the Klamath Falls Resource Area .....	3-9
3-3. Fragile Nonsuitable Woodland .....	3-10
3-4. Fragile Suitable, Restricted .....	3-11
3-5. Oregon's Instream Water Quality Standards .....	3-11
3-6. Beneficial Uses of Waters in the Klamath Basin as Listed in DEQ's Basin Rules .....	3-12
3-7. Water Impoundments on BLM-Administered Lands .....	3-13
3-8. Analytical Watersheds .....	3-14
3-9. Results of the 1988 DEQ Oregon Statewide Assessment of Nonpoint Source of Water Pollution .....	3-17
3-10. Results of Stream and Macroinvertebrate Sampling on BLM-administered Lands in the Resource Area .....	3-19
3-11. Average Structural Characteristics of Forest Vegetation in the Klamath Sustained Yield Unit (Medford and Klamath Falls) .....	3-23
3-12. Existing Older Forest Blocks .....	3-25
3-13. Dominant Seral Vegetation by Major Plant Group .....	3-30
3-14. Acres of Major Plant Groups and Seral Stages .....	3-31
3-15. Partial Listing of Existing or Potential Special Forest/Natural Products in the Klamath Falls Resource Area and their Possible Uses .....	3-32
3-16. List of Special Forest/Natural Products Sold Under Permit During Fiscal Years 1989 to 1993 .....	3-33
3-17. Streamside Riparian-Wetland Area Characteristics .....	3-35
3-18. Riparian Systems Identified for Potential Restoration Activities .....	3-36
3-19. Riparian-Wetland Locations .....	3-37

3-20.	Priority Animal Species .....	3-39
3-21.	Priority and Special Status Fish Habitat Conditions and Populations .....	3-42
3-22.	Special Status Plant Species .....	3-43
3-23.	Special Status Animal Species .....	3-44
3-24.	Potential Special Areas .....	3-49
3-25.	Visual Resources Inventory of BLM-Administered Lands .....	3-50
3-26.	Possible Wild, Scenic, and Recreational Rivers .....	3-51
3-27.	Potential Special Recreation Management Areas .....	3-53
3-28.	Recreation Site Key for Map 3-11 .....	3-54
3-29.	Existing and Potential Recreation Sites .....	3-55
3-30.	Existing and Potential Recreation Trails .....	3-57
3-31.	Total 1990 Recreation Visits to BLM Administered Land .....	3-58
3-32.	Timber Productivity Capability Classification (TPCC) Summary as of October 1, 1988 .....	3-59
3-33.	Comparison of Planning Area Timber Inventory Data 1976 and 1988 .....	3-61
3-34.	Forest Area and Growing Stock by Ownership and Timberhsed (1989) .....	3-62
3-35.	Timber Volume Harvested by County and Ownership (1983-1988) .....	3-63
3-36.	Timber Management and Forest Development Accomplishments to October 1, 1991 .....	3-64
3-37.	Acres of Stand Treatments Accomplished by Age Class .....	3-65
3-38.	Mineral Potential .....	3-67
3-39.	Resident Labor Force, Employment by Industry, Oregon .....	3-69
3-40.	Resident Labor Force, Employment by Industry, Klamath County .....	3-70
3-41.	Local Area Personal Income by Industry, Oregon .....	3-71
3-42.	Local Area Personal Income by Industry, Klamath County .....	3-72
3-43.	Forest Products Harvest Tax Rates Applicable to BLM Timber Purchasers .....	3-75
3-44.	Summary of Allotment Categorization .....	3-77
3-45.	Existing Range Land Improvements .....	3-79
3-46.	Distribution of Fires by Size Class, 1980 to 1993 Yearly Average .....	3-82
4-1.	Estimated Annual First-Decade Levels of Timber Management Activity by Alternative .....	4-13
4-2.	Timber Harvest Acreage Comparison Among Alternatives by Analytical .....	4-23
4-3.	BLM-Administered Land by Analytical Watershed (by percentages) .....	4-23
4-4.	Comparison of Alternatives, Changes in Components of Biological Diversity, Short Term .....	4-25
4-5.	Comparison of Alternatives, Changes in Components of Biological Diversity, Long Term .....	4-25
4-6.	Estimated Effects of Allocations by Alternative on Big Game. ....	4-51
4-7.	Estimated Effects of Allocations by Alternative on Black Bear. ....	4-54
4-8.	Estimated Effects of Allocations by Alternative on Cougar. ....	4-55
4-9.	Estimated Effects of Allocations by Alternative on Furbearers. ....	4-56
4-10.	Estimated Effects of Allocations by Alternative on Osprey. ....	4-57
4-11.	Estimated Effects of Allocations by Alternative on Accipiter Hawks. ....	4-58
4-12.	Estimated Effects of Allocations by Alternative on Prairie Falcon. ....	4-59
4-13.	Estimated Effects of Allocations by Alternative on Golden Eagle. ....	4-60
4-14.	Estimated Effects of Allocations by Alternative on Red-tailed Hawk. ....	4-61
4-15.	Estimated Effects of Allocations by Alternative on Dominant Woodpeckers. ....	4-62
4-16.	Percent of Optimum Woodpecker Population on BLM -Administered Lands .....	4-63
4-17.	Estimated Effects of Allocations by Alternative on Waterfowl and Sandhill Crane. ....	4-64
4-18.	Estimated Effects of Allocations by Alternative on Wild Turkey and Other Upland Game Birds .....	4-65
4-19.	Estimated Effects of Allocations by Alternative on Amphibians. ....	4-66
4-20.	Stand Ages or Period After Regeneration Timber Harvest, When Northern Spotted Owl Habitat is Attained. ....	4-72
4-21.	Suitable Spotted Owl Habitat by Alternative in the Klamath Falls Resource Area (1,000 acres) ..	4-73
4-22.	Northern Spotted Owl Habitat Changes (Category 1 and 2) by Alternative .....	4-74
4-23.	Suitable Northern Spotted Owl Habitat on U.S. Forest Service and BLM-Administered Lands in Western Oregon by Alternative (1,000 acres). ....	4-76
4-24.	Estimated Effects of Allocations by Alternative on the Bald Eagle. ....	4-81
4-25.	Estimated Effects of Allocations by Alternative on the Peregrine Falcon. ....	4-82
4-26.	Estimated Effects of Allocations by Alternative on the Northern Goshawk. ....	4-83
4-27.	Estimated Effects of Allocations by Alternative on the Sage Grouse. ....	4-84



4-28.	Estimated Effects of Allocations by Alternative on Townsend's Big-eared Bat .....	4-85
4-29.	Estimated Effects of Allocations by Alternative on the Shortnose, Lost River, and Klamath Largescale Sucker; and Western Pond Turtle. ....	4-86
4-30.	Effects on other Special Status Animal Species During the Short Term (10 Years) and Long Term (100 Years) Under the Various Alternatives. ....	4-88
4-31.	Estimated Effects of Allocations by Alternative on Trout. ....	4-90
4-32.	Probable Changes in the Condition of Potential Special Areas. ....	4-92
4-33.	Summary of Effects to Special Areas by Alternative. ....	4-94
4-34.	Probable Changes in Visual Resource Conditions in the Short Term. ....	4-99
4-35.	Probable Short-Term Changes in Outstandingly Remarkable Value .....	4-101
4-36.	Anticipated Short-Term Capability of BLM-Administered Facilities and Resources to Meet Projected Recreational Demand for 11 Major Use Categories by Alternative .....	4-105
4-37.	Summary Effect of Allocations on Land Available for Timber Production .....	4-109
4-38.	Miles and Acres of Road Construction (Annual). ....	4-111
4-39.	Summary Effect of Restrictions on Timber Resources. ....	4-112
4-40.	Western Oregon Timber - Millions of Cubic Feet (MMCF) per Year .....	4-117
4-41.	Mineral Potential (acres). ....	4-119
4-42.	Locatable Mineral Availability by Alternative (Acres). ....	4-120
4-43.	Oil and Gas Availability by Alternative (Acres). ....	4-121
4-44.	Geothermal Availability by Alternative (Acres). ....	4-121
4-45.	Salable Mineral Availability by Alternative (Acres). ....	4-122
4-46.	Summary of Measurable Annual Outputs by Alternative in the Klamath Falls Resource Area. ....	4-125
4-47.	Estimated Annual Dependent Personal Income and Employment by Alternative in the Klamath Falls Resource Area .....	4-126
4-48.	Estimated Dependent Personal Income and Employment by Alternative .....	4-128
4-49.	Projected Annual Oregon and California Payments to Counties Attributable to Timber Harvest in Western Oregon .....	4-131
4-50.	Change in AUMs by Alternative. ....	4-135

## Figures

2-1.	riparian Reserves .....	2-10
2-2.	Proposed Forest Condition Restoration Treatments in the Proposed Resource Management Plan. ....	2-50
2-3.	Process for Changing the Resource Management Plan .....	2-174
2-4.	Basic adaptive management model .....	2-175
3-1.	Typical West Side Seral Stages .....	3-28
3-2.	Ponderosa Pine Community Seral Stages .....	3-29
3-3.	Successional Stages of East Side Shrub/Grass Plan Community .....	3-29
4-1.	Changes in Suitable Owl Habitat (acres). ....	4-77

# Appendices

## Appendix A - Legal Guidelines

## Appendix B - Key Sections of the 1993 Record of Decision on Pacific Yew Environmental Impact Statement

The Decision .....	B-1
Mitigation Measures .....	B-2
Monitoring .....	B-3

## Appendix C - State Director Guidance for the Resource Management Plan Process

Guidance for Formulation of Alternatives .....	C-2
Klamath Falls Resource Area's Additions .....	C-3

## Appendix D - Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl

## Appendix E - Management for the Supplemental Environmental Impact Statement Special Attention Species

## Appendix F - Best Management Practices

Activity Planning and Design .....	F-3
Riparian Reserves .....	F-11
Soil Resource Protection .....	F-12
Fragile Soils .....	F-15
Roads .....	F-15
Timber Harvest .....	F-22
Silviculture .....	F-26
Firewood Program .....	F-28
Wildfire and Prescribed Fire .....	F-28
Mining .....	F-31
Livestock Grazing .....	F-35
Watershed Rehabilitation .....	F-37
Fisheries Habitat Improvement Projects .....	F-38
Recreation and Off-Highway Vehicle Use .....	F-38
Management of Competing Vegetation (Not Including Noxious Weeds) .....	F-40
Noxious Weed Control .....	F-41
Water Source Development and Use .....	F-42
Erosion Control Practices .....	F-42
Definitions and Proper Functioning Condition .....	F-42

## Appendix G - Timber Management

Silvicultural Systems Utilized in the Design of the Proposed Action .....	G-1
Objectives, Habitat Criteria, and Management Practices Design for the Land Use Allocations .....	G-8
Forest Genetics Program .....	G-13

## Appendix H - Special Areas

Identification and Screening of Candidate Areas of Critical Environmental Concerns ...	H-1
Candidate Area of Critical Environmental Concern Screening Results .....	H-2
Present condition of Potential Special Areas .....	H-4
Potential Management of Candidate Areas of Critical Environmental Concerns Dropped from Consideration .....	H-6

## **Appendix I - Wild and Scenic Rivers**

Management Guidelines and Standards for National Wild and Scenic Rivers .....	I-1
Recreational River Areas .....	I-2
Scenic River Areas .....	I-3
Wild River Areas .....	I-5
Management Objectives Common to Recreational, Scenic, and Wild River Areas .....	I-6
Wild and Scenic River Eligibility and Classification Determinations .....	I-8
Wild and Scenic River Suitability Assessments .....	I-12
Upper Klamath River .....	I-15
Management Direction for the Upper Klamath River in California .....	I-27

## **Appendix J - Recreation**

Recreation Opportunity Spectrum Classes .....	J-1
---	-----

## **Appendix K - Proposed Restrictions on Mineral and Energy Exploration and Development Activity**

Leasable Mineral Resources .....	K-1
Oil and Gas Operations .....	K-2
Geothermal Leasing .....	K-2
Leasing Notice and Stipulation Summary .....	K-3
Locatable Minerals Surface Management in the Lakeview District .....	K-17
Guidelines for Development of Salable Mineral Resources in the Lakeview District ...	K-20

## **Appendix L - Grazing Management**

Livestock Grazing Allotments .....	L-1
Management Summaries by Allotment .....	L-5
Potential Range Improvements by Allotment .....	L-65
Range Land Monitoring and Evaluation .....	L-70
General Allowable Use Guidelines .....	L-74
Grazing in Riparian-Wetland Areas .....	L-75

## **Appendix M - Land Tenure**

Land Ownership Adjustment Criteria .....	M-1
Zone 3 Lands .....	M-2

## **Appendix N - Mineral and Non-Mineral Development Scenarios**

Leasable Mineral Resources .....	N-1
Locatable Mineral Resources .....	N-6
Salable Mineral Resources .....	N-8
Alternative Non-Mineral Energy Development Scenarios .....	N-9

## **Appendix O - Resource Management Plan Monitoring**

All Land Use Allocations .....	O-1
Riparian Reserves .....	O-2
Late-Successional Reserves .....	O-4
Matrix .....	O-5
Air Quality .....	O-6
Water and Soils .....	O-7
Wildlife Habitat .....	O-9
Fish Habitat .....	O-10
Special Status and Supplemental Environmental Impact Statement Special	
Attention Species Habitat .....	O-12
Special Areas .....	O-13
Cultural Resources Including American Indian Values .....	O-14

Visual Resources .....	O-16
Wild and Scenic Rivers .....	O-17
Rural Interface Areas .....	O-18
Socioeconomic Conditions .....	O-19
Recreation .....	O-20
Timber Resources .....	O-21
Special Forest/Natural Products .....	O-22
Grazing Management .....	O-22
Noxious Weeds .....	O-24
Fire/Fuels Management .....	O-24
<b>Appendix P - Water Resources and Basic Hydrologic Principles</b>	
Water Quantity .....	P-1
Water Quality .....	P-3
Riparian-Wetland Areas .....	P-8
<b>Appendix Q - Fisheries</b>	
Fish Species in the Klamath Falls Resource Area .....	Q-1
Stream Habitat Quality Rating .....	Q-1
<b>Appendix R - Cultural Resources</b>	
Cultural Resource Inventory Procedures .....	R-1
<b>Appendix S - Soil Resources</b>	
Forest Inventory .....	S-1
Soils .....	S-3
Compaction and Displacement .....	S-4
Soil Erosion and Mass Wasting (Landsliding) .....	S-5
The Role of Soil in Watershed Health .....	S-6
<b>Appendix T - Analytical Assumptions About Global Climate Change</b>	
<b>Appendix U - Management Direction and Consequences of Managing Visual Resources Under Each Alternative</b>	
<b>Appendix V - Selection of Harvest Scheduling Model and Probable Sale Quantity Calculation Process</b>	
Selection of Model .....	V-1
Probable Sale Quantity Calculation Process .....	V-1
TRIM-PLUS Probable Sale Quantity Runs .....	V-6
<b>Appendix W - Effects on Timber Management</b>	
Timber Supply analysis for BLM Planning .....	W-1
Effects of Silvicultural Practices and Silvicultural Systems on Wood Quality, Timber Yields, and Economic Value .....	W-6
Effects of silvicultural Systems .....	W-9
References .....	W-13
<b>Appendix X - Consistency with Other Agency Plans and Programs</b>	
Federal Agencies .....	X-1
State Government .....	X-2
Local Government .....	X-3
Relationship of Proposed Resource Management Plan to Statewide Planning Goals .....	X-11
<b>Appendix Y - Public Involvement</b>	
Summary of Scoping .....	Y-1

Public Involvement Following Publication of the Draft Resource Management Plan/ Environmental Impact Statement .....	Y-3
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<b>Appendix Z - Comment Responses and Reprinted Letters</b>	
Comment/Responses .....	Z-4
Reprinted Letters .....	Z-131

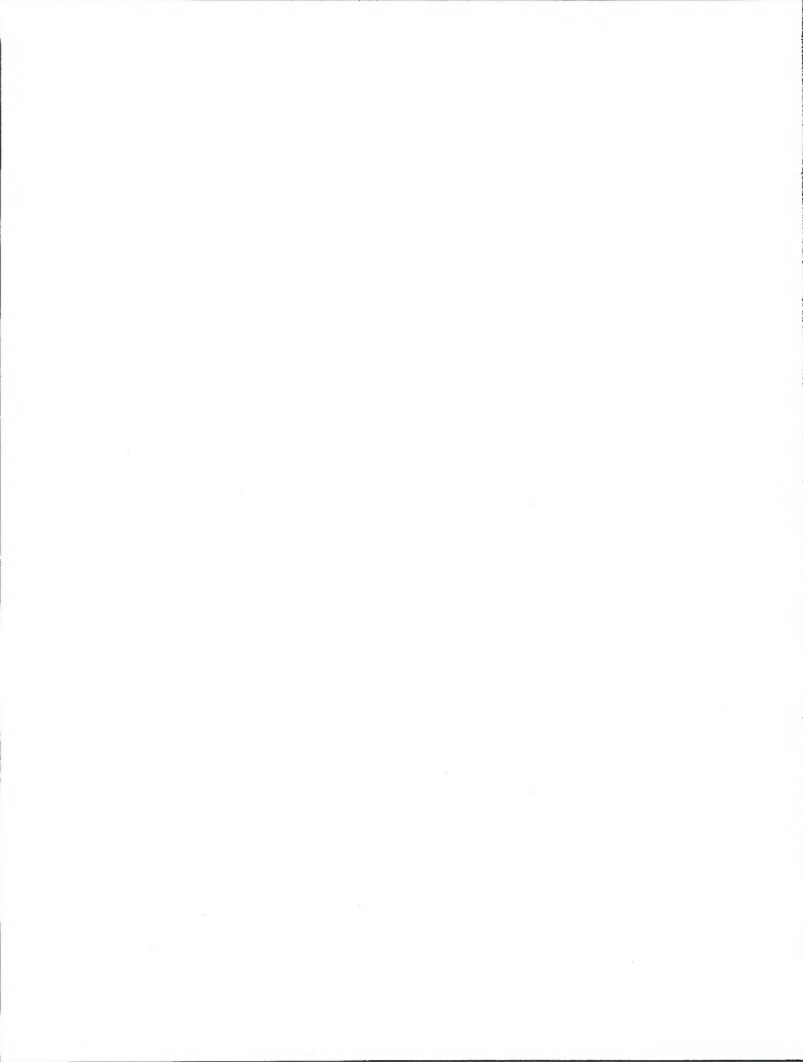
## Appendice Tables

F-1. Riparian Reserve Widths (in feet) .....	F-8
F-2. Erosion Potential .....	F-11
F-3. Guide for Placing Common Soil and Geologic Types into Soil Erosion and Soil Infiltration Classes to Space Lateral Road Drainage Culverts. ....	F-45
F-4. Guide for Maximum Spacing of Lateral Drainage Culverts by Soil Erosion Classes and Road Grade .....	F-46
F-5. Water Bar Spacing .....	F-25
F-6. Guidelines for Levels of Burn Intensity .....	F-30
F-7. Utilization Standards in Riparian-Wetland Areas .....	F-36
F-8. Degree of Allowable Use .....	F-37
F-9. Application Technique .....	F-40
F-10. Application Technique .....	F-41
G-1. SGFMA Target Stand Species Composition Objectives. ....	G-10
G-2. Treatment Priority by Ecological Type .....	G-11
I-1. Classification Criteria for Wild, Scenic, and Recreational River Areas .....	I-11
I-2. Ranking of Outstanding Remarkable Values in SCORP Region 9 .....	I-15
I-3. Whitewater Classification on the Upper Klamath River .....	I-18
I-4. Threatened, Endangered, and State Sensitive Fish and Wildlife in the Upper Klamath River Corridor .....	I-19
I-5. Potential Classification Summary for Upper Klamath River .....	I-20
I-6. Segment Ownership and Status Within the Upper Klamath River Corridor .....	I-23
N-1. Mitigative Measures for the No-Dam Alternative .....	N-14
V-1. Existing Stand condition Codes .....	V-3
W-1. Regional Market Equilibrium Results by BLM Resource Management Plan Theme .....	W-3
W-2. Results for the 1993-2000 Private Harvest Disaggregation and 2001-2010 Harvest Projections .....	W-4
W-3. Log Consumption Results by BLM Resource Management Plan Theme .....	W-5
W-4. Effect of Pruning on Douglas-fir Wood Quality .....	W-8
W-5. Summary of Silvicultural Prescriptions Analyzed .....	W-9
W-6. Comparison of Yield Changes & Economic Returns for a 60 and 100 year Rotation .....	W-11
W-7. Selected Tree Characteristics Which Affect Wood Quality .....	W-12
X-1. Consistency of the Proposed Resource Management Plan with the Forestry Program for Oregon ....	X-4
X-2. Consistency of the Proposed Resource Management Plan with State of Oregon Wildlife Plans .....	X-7

## Appendice Figures

N-1. No-dam alternative, diversion facilities at J.C. Boyle Powerhouse .....	N-11
N-2. No-dam alternative general plan .....	N-12
P-1. Groundwater system relationships .....	P-13
V-1. Probable Sale Quantity Flow Chart .....	V-2

V-2.	Harvest patches by TRIM-PLUS .....	V-8
W-1.	Value of Ponderosa Pine Logs (pruned vs. unpruned) .....	W-7
W-2.	Breakeven Cost of Pruning Ponderosa Pine (for different site qualities with and without Commercial Thinning).....	W-8

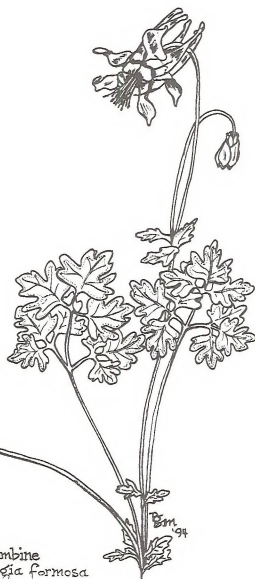




# Klamath Falls Resource Area Plan Summary

## Contents

Introduction .....	3
Alternatives .....	3
The Proposed Resource Management Plan .....	5
Vision .....	5
Strategy .....	6
Ecological Principles for .....	8
Management of Late-Successional Forests .....	8
Aquatic Conservation Strategy .....	8
Key Watersheds .....	9
Watershed Analysis .....	9
Watershed Restoration .....	9
Riparian Reserves .....	9
Late-Successional/District Designated Reserves .....	10
Matrix (General Forest Management Area) .....	11
Air Quality .....	11
Water and Soils .....	11
Wildlife Habitat .....	12
Fish Habitat .....	12
Special Status Species and Supplemental Environmental .....	12
Impact Statement: Special Attention Species .....	12
Special Areas .....	13
Cultural Resources Including American Indian Values .....	13
Wild and Scenic Rivers .....	13
Visual Resources .....	13
Rural Interface Areas .....	14
Socioeconomic Conditions .....	14
Recreation .....	14
Timber Resources .....	14
Special Forest/Natural Products .....	15
Energy and Minerals .....	16
Livestock Grazing .....	16
Land Tenure Adjustments .....	16
Roads .....	16
Hydroelectric or Alternative Energy Projects .....	16
Monitoring the Resource Management Plan .....	16
Public Involvement .....	17



Red columbine  
*Asclepija formosa*



# Introduction

The Klamath Falls Resource Area Resource Management Plan will establish guidelines for the management of BLM-administered land in the Klamath Falls resource Area for at least ten years. It will supersede and replace the Jackson/Klamath and Lost River Management Framework plans covering the same area, completed in 1980 and 1983. The Proposed Resource Management Plan/Final Environmental Impact Statement has been prepared in accordance with the BLM planning regulations issued under authority of the Federal Land Policy and Management Act and written in accordance with Council on Environmental Quality regulations issued under authority of the National Environmental Policy Act.

The BLM-administered lands in the planning area consist of 212,000 acres of BLM-administered surface and subsurface estate, and 21,000 acres of BLM subsurface estate only (private or state owned surface). Within this total acreage are 46,000 acres of revested Oregon and California grant lands, and 166,000 acres of public domain lands. All of the Oregon and California lands are located west of Highway 97. In this document "west side" refers to land west of Highway 97, and "east side" refers to land east of Highway 97.

The public land acquired at the mouth of the Wood River is not included in this document. A separate Resource Management Plan is being developed for the Wood River property. This Upper Klamath Basin Draft Resource Management Plan/Environmental Impact Statement was released for public review in March 1994, and a Final Resource Management Plan for the Wood River property will be completed in 1995.

## Alternatives

Seven alternatives have been developed to provide a range of responses to major issues identified earlier in the planning process. These issues are: timber production practices; old growth forests; habitat diversity; threatened and endangered species habitat; special areas; visual resources; stream, riparian, and water quality protection; recreation resources; land tenure; rural interface areas; Wild and Scenic Rivers; hydroelectric and alternative energy projects; and grazing. Of particular interest is whether or not to harvest the remaining old growth forests and the related effects on regional and local economies, biological diversity and the northern spotted owl, a federally listed threatened species.

Each alternative offers a possible broad course of action that, if selected, would provide guidelines for future, more specific decisions. Site-specific management for various resources, annual timber sale plans, and issuance of rights-of-way, leases or permits will follow the guidelines identified in the Resource Management Plan.

Selected land use or resource allocations of the alternatives are shown in Table S-1, found at the end of the summary. Analysis of effects of each alternative except No Action has been facilitated by development of ten-year representative timber management scenarios. These reflect possible timber harvest units, roads and timber management practices during the first ten years of the Resource Management Plan. These scenarios include different levels of forest management practices (also shown in Table S-1). Anticipated environmental consequences of the alternatives are summarized in Table S-2, also located at the end of the summary.

A summary of the Proposed Resource Management Plan, and Alternatives No Action, A, B, C, D, and E follows. A map of the resource area's proposed resource management plan strategy is enclosed.

**Alternative No Action.** This alternative would entail no change from the management direction established in the current management framework plans (except where the Congress has since enacted legislation prescribing different management direction for specific geographic areas or transferring specific lands to the administration or ownership of other parties). Emphasis would be on multiple use and sustained yield practices. On lands west of Highway 97 timber production would be emphasized. Measures to protect the environment would be minimized to avoid conflicts with timber production. No special actions would be implemented to protect old growth ecosystems. Measures implemented to protect habitats of threatened and endangered species would continue. Other species of concern would be protected to the extent consistent with timber production. Riparian zones would be protected to the extent consistent with high timber production. On lands east of Highway 97, a moderate level of timber production would continue, as would a moderate level of livestock grazing. Protective measures would continue to be used in riparian zones, habitats of threatened and endangered species, and areas of special value. Special recreation management area designations would continue in the Klamath River Canyon and the Gerber block. No areas of critical environmental concern would be declared in the resource area. Eligible river segments, including the upper Klamath River, would be managed under interim protective

## **Klamath Falls Resource Area Plan Summary**

management until the Congress determines whether or not they are suitable for inclusion in the National Wild and Scenic Rivers System.

**Alternative A.** This alternative would contribute to community stability by emphasizing a high production of timber, forage, and other economically important values on all lands. It would produce the highest sustained yield of timber on all suitable forest lands legally available for harvest. Livestock forage would be produced at the highest sustained yield. Threatened and endangered species habitat and habitats of species proposed for such status would be managed as legally required. Habitats of other species with high potential for listing known to exist only on BLM-administered lands would be protected. To meet legal requirements for protection of wetlands and water quality, as well as protect fish habitat and other relevant values, riparian zones would be managed according to requirements of the Oregon Forest Practices Act and the Federal Water Pollution Control Act. A right-of-way would be issued for the Salt Caves project. Recreation management would emphasize dispersed motorized recreation and high use of existing recreation sites and trails.

**Alternative B.** On Oregon and California lands west of Highway 97, this alternative would contribute to community stability by emphasizing timber production and other economically important values to the extent consistent with a variety of other land uses, such as fish and wildlife habitat, recreation, and scenic resources. A system of old growth and mature forest blocks would be retained to contribute to ecological functions important to timber productivity. On lands east of Highway 97, to contribute to community stability forage production and other economically important values would be emphasized to the extent consistent with a variety of other land uses, such as fish and wildlife habitat, recreation, and scenic resources. Habitats of threatened and endangered species and species proposed for such status would be protected on all lands. Other species of related concern would be protected to the extent consistent with high timber or forage production. Timber harvest would not be planned in riparian zones of important waters. A right-of-way would be issued for the Salt Caves project. All existing areas of environmental concern would be retained, with three new ones designated. No rivers would be found suitable for designation as wild, scenic, or recreational. Scenic resources would be managed in selected special status and high use areas. Recreation management would provide for a wide range of developed and dispersed recreation uses. Special forest management practices would be applied in rural interface areas, which include lands zoned for 1- to 5-acre residential lots.

**Alternative C.** On all lands, this alternative would contribute to community stability by providing timber and forage production and other economically important values to the extent consistent with a variety of other land uses, such as fish and wildlife habitat, recreation, and scenic resources. It would emphasize retention and improvement of biological diversity by retaining a system that maintains some old growth and mature forest, stressing connectivity, and focusing on areas where special status plant and animal species cluster. Habitats of threatened and endangered species, species proposed for such status, and species with a high potential for federal listing would be protected. Other species of related concern would be protected primarily through the emphasis on biological diversity. Timber harvest would not be planned in or immediately adjacent to riparian zones of important waters. Four areas of critical environmental concern would be designated. No rivers would be found suitable for designation as wild or scenic; however, segment 2 of the Upper Klamath River would be found suitable as recreational. A right-of-way would not be issued for the Salt Caves project. Scenic resources would be managed in selected special status and high use areas, with particular emphasis on providing protection in existing and proposed wild and scenic river corridors. Recreation management would provide for a wide range of recreation opportunities by emphasizing dispersed use. Special forest management practices would be applied in rural interface areas, which include lands zoned for 1- to 20-acre residential lots.

**Alternative D.** This alternative would emphasize protection and reestablishment of northern spotted owl habitat and riparian ecosystems. Management and enhancement of other values, such as diversity of wildlife habitat, dispersed non-motorized recreation opportunities, and scenic resources would also be emphasized to the extent consistent with a variety of other land uses, including some timber and forage production. Spotted owl habitat would be protected in accordance with the Conservation Strategy for the Northern Spotted Owl. Species with a high potential for federal listing as threatened or endangered and species of related concern would be protected. Timber harvest would not be planned in and adjacent to riparian zones of important waters or their immediate tributaries. A sustained yield of livestock forage would be produced while providing a high amount of forage both to wildlife and the Pokegama Wild Horse Herd. Eight areas of critical environmental concern would be designated. No rivers would be found suitable for designation as wild or recreational; however, segment 2 of the Upper Klamath River would be found suitable as scenic. A right-of-way would not be issued for the Salt Caves project. All



identified scenic resources would be managed to protect those resources. Recreation management would emphasize dispersed non-motorized opportunities. Special timber harvest and forest management practices would be applied in rural interface areas, which include lands zoned for 1- to 20-acre residential lots.

**Alternative E.** This alternative would emphasize protection of older forests, management of native plant communities, and management and enhancement of other values, such as dispersed non-motorized recreation opportunities and scenic resources. All old growth forest stands would be retained. A sustained yield of timber would be produced to the extent consistent with the emphasis on these other values. A sustained yield of livestock forage would be produced while providing the highest amount of forage to both wildlife and the Pokegama Wild Horse Herd. Species with a high potential for federal listing as threatened or endangered and species of related concern would be protected. Timber harvest would not be planned in and adjacent to riparian zones. Eight areas of critical environmental concern would be designated. No rivers would be found suitable for designation as wild or recreational; however, Miller Creek, Barnes Valley Creek, Spencer Creek, segments A and C of Antelope Creek, and segment 2 of the Upper Klamath River would be found suitable as scenic. A right-of-way would not be issued for the Salt Caves project. All identified scenic resources would be managed and some visual resource protection would be provided for all lands. Recreation management would emphasize dispersed non-motorized opportunities. Special timber harvest and forest management practices would be applied in rural interface areas.

**Proposed Resource Management Plan.** This alternative would emphasize ecosystem management. Resources would be managed with an emphasis on retention of late-successional forest, restoration and/or maintenance of watershed conditions, protection of special status and other species requiring special attention, and a variety of other land uses. A system of Late-Successional/District Designated Reserves would be established. Connectivity/diversity would also be provided in the Matrix by growing forests on long rotations and retaining parts of the stands at harvest. Activities in the general forest management area would emphasize production of timber to contribute to community stability, but a biological legacy of previous stands would be retained (for example, large green trees, snags, and downed coarse woody debris). Habitats of threatened and endangered species, species proposed for such status, species with a high potential for federal listing as threatened or endangered, and other species requiring special attention would be pro-

tected. Riparian Reserves would be established generally much wider than riparian zones. Management activities in Riparian Reserves would be guided by Aquatic Conservation Strategy objectives. Nine new special areas would be designated. One river segment would be found suitable for designation as a scenic river component of the National Wild and Scenic Rivers System. Visual resources would be protected in selected scenic and/or sensitive areas. Particular emphasis would be placed on scenic values along the river segment found suitable for designation. Recreation management would provide a wide range of facility-dependent and dispersed recreation opportunities, with emphasis on dispersed activities. Special forest management practices would be considered for BLM-administered land in rural interface areas (that is, one quarter mile around 1- to 20-acre zoned areas).

## The Proposed Resource Management Plan

The Proposed Resource Management Plan was developed partially in response to public comments related to the Bureau of Land Management's August 1992 draft resource management plans for western Oregon. In addition the proposed plan incorporates the land use allocations and management direction from the 1994 *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* and its Attachment A.

Much of the BLM-administered land in the Klamath Falls Resource Area was not covered by the supplemental environmental impact statement because it is outside the range of the northern spotted owl. However, an effort similar to the western Oregon supplemental environmental impact statement process is currently in progress for eastern Oregon (called the Eastside Ecosystem Management Project). An environmental impact statement is being developed, but a draft environmental impact statement has not been released yet. In the Klamath Falls Resource Area, any requirements, goals, and objectives devised as a result of the Eastside Ecosystem Management Project's future environmental impact statement record of decision will be incorporated into the resource area's management programs as appropriate.

## Vision

The Bureau of Land Management will manage the natural resources under its jurisdiction in western

## Klamath Falls Resource Area Plan Summary

Oregon to help enhance and maintain the ecological health of the environment and the social well being of human populations.

There are several basic principles supporting this vision:

- ♦ natural resources can be managed to provide for human use and a healthy environment;
- ♦ resource management must be focused on ecological principles to reduce the need for single resource or single species management;
- ♦ stewardship, the involvement of people working with natural processes, is essential for successful implementation;
- ♦ the Bureau of Land Management cannot achieve this vision alone, but can, by its management processes and through cooperation with others, be a significant contributor to its achievement; and
- ♦ a carefully designed program of monitoring, research, and adaption will be the change mechanism for achieving this vision.

## Strategy

Lands administered by the Bureau of Land Management will be managed to maintain healthy, functioning ecosystems while providing a sustainable production of natural resources. This management strategy,

titled ecosystem management, involves the use of ecological, economic, social, and managerial principles to ensure the sustained condition of the whole. Ecosystem management emphasizes the complete ecosystem instead of individual components and looks at sustainable systems and products that people want and need. It seeks a balance between maintenance and restoration of natural systems and sustainable yield of resources. It is based on the premise that economic health can not be sustained without ecological health.

The building blocks for this strategy are comprised of several major land use allocations - Riparian Reserves, Late-Successional/District Designated Reserves, Adaptive Management Areas (none of which occur in the Klamath Falls Resource Area), Matrix which includes General Forest Management Areas, and Connectivity/Diversity Blocks (none of which occur in the Klamath Falls Resource Area). The Matrix in the Klamath Falls Resource Area is designed to provide connectivity and biological diversity across the landscape rather than in the connectivity/diversity blocks. These land use allocations are located and configured in the landscape to support overall ecosystem function and to meet the vision for management of federal lands in western Oregon. Additional land use allocations include a variety of special purpose management areas such as recreation sites, wild and scenic rivers, and visual resource management areas. These major land use allocations are displayed in Figures S-1 and S-2.

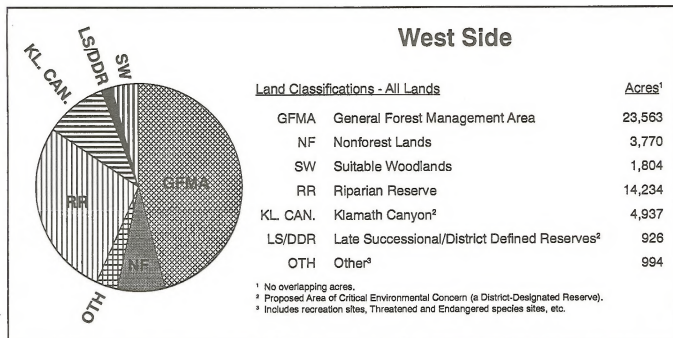


Figure S-1. Land use allocation summary, west side.

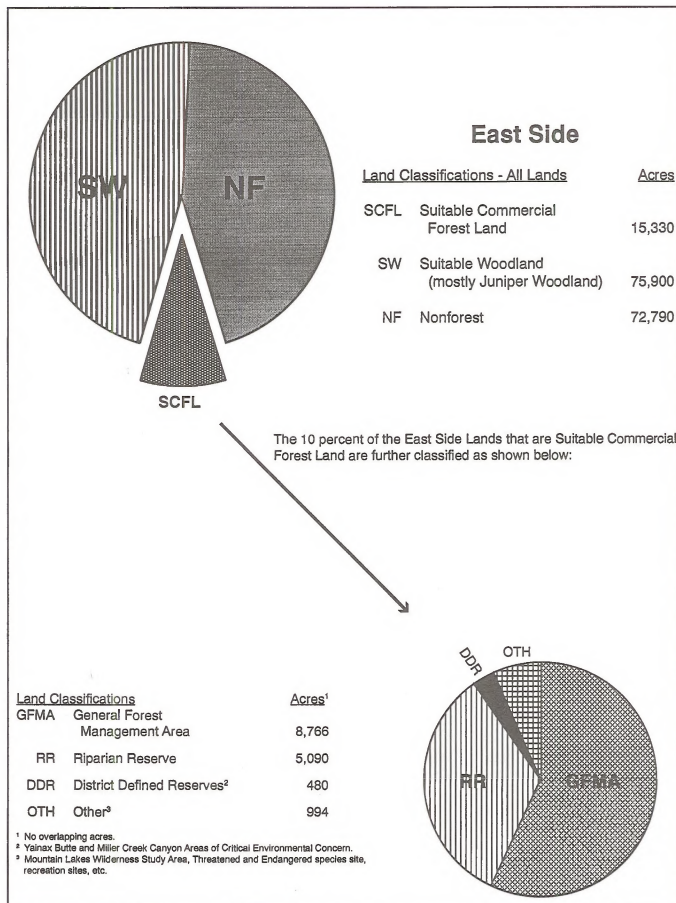


Figure S-2. Land use allocation summary, east side.



## ***Klamath Falls Resource Area Plan Summary***

Each land use allocation will be managed according to specific objectives and management actions/direction. During initial implementation of the plan, the stated objectives and management actions/direction will provide the rules and limits governing actions and the principles specifying the environmental conditions or levels to be achieved and maintained. As the BLM gains experience in implementing the plan and applying the concepts of adaptive management, the stated objectives and management actions/direction will be refined for specific geographic areas.

There are two major management concepts underlying the plan - Ecological Principles for Management of Late-Successional Forests and the Aquatic Conservation Strategy.

### **Ecological Principles for Management of Late-Successional Forests**

One goal of the proposed plan is to maintain late-successional and old growth species habitat and ecosystems on federal lands. A second goal is to maintain biological diversity associated with native species and ecosystems in accordance with laws and regulations.

All land use allocations described in the proposed plan will contribute to these two goals. For instance, Late-Successional /District Designated and Riparian Reserves and many special areas (for example, some areas of critical environmental concern) will be managed to enhance and/or maintain late-successional forest conditions. The Matrix will be managed to retain late-successional forest legacies while providing diversity (for example, coarse woody debris, large green trees, snags, and late-successional forest patches).

### **Aquatic Conservation Strategy**

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands.

The Aquatic Conservation Strategy is designed to meet the following objectives:

- ◆ Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic

systems to which species, populations and communities are uniquely adapted.

- ◆ Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.
- ◆ Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
- ◆ Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
- ◆ Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
- ◆ Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing (that is, movement of woody debris through the aquatic system). The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
- ◆ Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
- ◆ Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
- ◆ Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

The components of the Aquatic Conservation Strategy are Key Watersheds, Watershed Analysis, Watershed Restoration, and Riparian Reserves.

## **Key Watersheds**

Key Watersheds are a system of large refugia that are crucial for maintaining and recovering habitat for at-risk stocks of resident fish species. These refugia include areas of high quality habitat and areas of degraded habitat. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat have high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program (see the Watershed Restoration section that follows).

There are two types of Key Watersheds - Tier 1 and Tier 2. Tier 1 watersheds contribute directly to conservation of at-risk fish species. They also have a high potential of being restored as part of a watershed restoration program. Tier 2 watersheds do not contain at-risk fish stocks, but they are important sources of high quality water.

Key Watersheds in the resource area are Spencer Creek (Tier 1 - approximately 40,850 acres of public and private land), Clover Creek (Tier 2 - approximately 13,950 acres of public and private land), and a portion of (Johnson Creek) Jenny Creek (Tier 1 - approximately 133,000 acres of public and private land).

Key Watersheds overlay portions of most land use allocations in the district and place additional management requirements or emphasis on activities in those areas.

## **Watershed Analysis**

Watershed analysis is one of the principle analyses that will be used to meet the ecosystem management objectives of this Resource Management Plan. Watershed analysis will be the mechanism to support ecosystem management at approximately the 20 to 200 square mile watershed level.

Watershed analysis will focus on collecting and compiling information within a watershed that is essential for making sound management decisions. It will be an analytical process, not a decision-making process with a proposed action requiring National Environmental Policy Act documentation. It will serve as a basis for developing project-specific proposals,

and determining monitoring and restoration needs for a watershed. Project-specific National Environmental Policy Act planning will use information developed from watershed analysis. For example, if watershed analysis shows that restoring certain resources within a watershed could contribute to achieving Aquatic Conservation strategy objectives, then subsequent decisions will need to address that information.

## **Watershed Restoration**

Watershed restoration will be an integral part of a program to aid recovery of fish habitat, riparian-wetland habitat, and water quality. The most important components of a watershed restoration program are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of instream habitat complexity. Other restoration opportunities include meadow and wetland restoration and mine reclamation.

## **Riparian Reserves**

Riparian Reserves support Aquatic Conservation Strategy objectives and provide habitat for special status species and Supplemental Environmental Impact Statement Record of Decision special attention species.

There are approximately 19,450 west side acres and 9,100 east side acres of riparian reserves in the Area. Calculation of these acres is based on prescribed widths and estimated miles of stream in the various categories described in the Supplemental Environmental Impact Statement Record of Decision. The widths are intended to provide a high level of fish, wildlife and plant habitat and riparian protection until watershed and site analysis can be completed. Although Riparian Reserve boundaries on permanently flowing streams may be adjusted, they are considered to be the approximate widths necessary for attaining Aquatic Conservation Strategy objectives.

The initial Riparian Reserve widths for the Klamath Falls Resource Area are as follows:

**Fish-bearing streams.** Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.

## **Klamath Falls Resource Area Plan Summary**

### **Permanently flowing non-fish-bearing streams.**

Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest.

**Seasonally flowing or intermittent streams, wetlands less than one acre, and unstable and potentially unstable areas.** This category applies to features with high variability in size and site-specific characteristics. At a minimum the Riparian Reserves will include:

- ◆ the extent of unstable and potentially unstable areas;
- ◆ the stream channel and the area extending to the top of the inner gorge;
- ◆ the stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation; and
- ◆ the area extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest.

**Constructed ponds and reservoirs, and wetlands greater than one acre.** Riparian Reserves consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or to 150 feet slope distance from the edge of a wetland greater than one acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest. (Riparian vegetation and seasonally saturated soils will generally constitute a wetland and will be managed as prescribed for wetlands.)

**Lakes and Natural Ponds.** Riparian Reserves consist of the body of water and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance, whichever is greatest. (Riparian vegetation and seasonally saturated soils will generally constitute a wetland and will be managed as prescribed for wetlands.)

As a general rule, management actions/direction for Riparian Reserves prohibit or regulate activities that retard or prevent attainment of Aquatic Conservation Strategy objectives. Watershed analysis and appropriate National Environmental Policy Act compliance will be required to change Riparian Reserves in all watersheds.

Timber harvest, including fuelwood cutting, will be precluded in Riparian Reserves, with exception of salvage if required to attain Aquatic Conservation Strategy objectives after catastrophic events, or when watershed analysis determines that present and future woody debris needs are met and other Aquatic Conservation Strategy Objectives are not adversely affected.

Silvicultural practices will be applied in Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

New roads in Riparian Reserves will be designed to meet Aquatic Conservation Strategy objectives.

## **Late-Successional/District Designated Reserves**

Late-Successional/District Designated Reserves will be established to protect and enhance conditions of late-successional and old growth forest ecosystems, which serve as habitat for late-successional and old growth forest-related species including the northern spotted owl; and to maintain a functional, interacting, late-successional and old-growth forest ecosystem.

In the Klamath Falls Resource Area there are only unmapped Late-Successional/District Designated Reserves, not the large mapped Late-Successional Reserves shown in the Supplemental Environmental Impact Statement. On the west side of the resource area there are approximately 1,600 acres allocated to Late-Successional/District Designated Reserves.

The Klamath Falls Resource Area draft Preferred Alternative's Protected Habitat Areas have become unmapped Late-Successional/District Designated Reserves in the proposed resource management plan/environmental impact statement. The Protected Habitat Area Buffers are still a part of the matrix, but retain the resource area's special management restrictions. The Protected Habitat Area Buffers are now called Late-Successional/District Designated Reserve buffers.

Silvicultural treatments that are beneficial to the creation of late-successional habitat will be conducted inside Late-Successional/District Designated Reserves.

If needed to create and maintain late-successional forest conditions, thinning operations will be conducted in forest stands up to 80 years of age. This will be accomplished by pre-commercial or commercial thinning of stands regardless of origin (for example, planted after logging or naturally regenerated after fire or blowdown).

Salvage of dead trees in Late-Successional/District Designated Reserves will be limited to areas where stand-replacing events exceed ten acres in size. All standing live trees, including those injured (for example, scorched) but likely to survive, will be retained, as well as snags that are likely to persist until late-successional forest conditions have developed and a new stand is again producing large snags.

## **Matrix (General Forest Management Area)**

The lands in the Matrix are expected to:

- ◆ Produce a sustainable supply of timber and other forest commodities.
- ◆ Provide connectivity (along with other allocations such as Riparian Reserves) across the landscape for forest dependent plant and animal species.
- ◆ Provide habitat for a variety of organisms associated with both late-successional and younger forests.
- ◆ Provide for important ecological functions such as dispersal of organisms, carry over of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees.
- ◆ Provide early-successional habitat.

The Matrix, or General Forest Management Area, on the west side, totals approximately 23,550 acres. Included in the Matrix are approximately 2,300 acres of buffers around the District Designated Reserves. Management for these buffers is more restrictive than the normal Matrix prescription. On the east side of the resource area there are approximately 8,750 acres of BLM-administered land in the General Forest Management Area.

Timber harvest and other silvicultural activities will be conducted in that portion of the Matrix with suitable forest lands. Across the resource area uneven age management will be used. On the west side 16 to 25 large green trees per acre (where available) will be retained after harvest. On the east side 5 to 10 of the largest and healthiest green trees will be retained. Management direction is summarized in the Timber Resources section later in this summary.

Timber harvest will be conducted so as to provide a renewable supply of large down logs well distributed across the Matrix landscape in a manner that meets the needs of species and provides for ecological functions. Down logs will reflect the species mix of the original stand.

On the west side, in fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest all remaining late-successional forest stands will be retained.

## **Air Quality**

Efforts to meet National Ambient Air Quality Standards, Prevention of Significant Deterioration goals, and the visibility protection plan will continue. Activities will be conducted so as to maintain and enhance air quality and visibility in a manner consistent with the Clean Air Act and the Oregon State Implementation Plan.

Smoke emissions will be controlled by planning, conducting, monitoring, and, if necessary, adjusting prescribed fire activities in accordance with the State Implementation Plan and the Oregon Smoke Management Plan.

Reduce broadcast burning in favor of lower intensity underburning. Use emission reduction mitigation measures and smoke dispersal techniques to the greatest extent practical. Wildfire hazard reduction, site preparation, and the use of prescribed fire for species habitat mitigation will be implemented in a manner consistent with ecosystem management.

## **Water and Soils**

The Aquatic Conservation Strategy and Riparian Reserve management previously discussed are the main elements of water and soils management.

In addition, management will contribute toward improvement or maintenance of water quality to protect recognized beneficial uses, and will strive to improve and/or maintain soil productivity.



## **Klamath Falls Resource Area Plan Summary**

Soil and water conditions will be improved and/or maintained by closing selected areas to off-highway vehicle use and/or limiting such use to existing or designated roads and trails. See the Recreation section later in this summary, for additional details.

The BLM will continue to implement a nonpoint source management program in cooperation with the U. S. Environmental Protection Agency and the Oregon Department of Environmental Quality. Coordination with the Oregon Department of Environmental Quality for implementation of best management practices which protect beneficial uses of water will also continue.

Consistency of management activities with Oregon's *Statewide Water Quality Management Plan* for forest practices and with Oregon's water quality criteria and guidelines (Oregon Administrative Rule 340-41) will be ensured.

Flood plains and wetlands will be protected in accordance with Executive Orders 11988 and 11990 and BLM's *Riparian-Wetlands Initiative for the 1990s*.

## **Wildlife Habitat**

Late-Successional/District Designated Reserve, Riparian Reserve, and Matrix management all contribute to management of wildlife habitat. Management will be directed to enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations. Management for Special Status and Supplemental Environmental Impact special attention species habitat (discussed later) also addresses many wildlife species.

## **Fish Habitat**

The Aquatic Conservation Strategy drives fish habitat management. Riparian Reserve management is a key element of management intended to maintain or enhance the fisheries potential of streams and other waters consistent with BLM's Fish and Wildlife 2000 Plan, the Bring Back the Natives Initiative, and other nationwide initiatives. This management is also intended to promote the rehabilitation and protection of fish stocks at risk and their habitat.

Priority for fish habitat enhancement projects will be given to watersheds supporting at-risk fish species and stocks and those requiring extensive restoration. Actions will be taken to rehabilitate streams and other waters to enhance natural populations of resident fish. Possible rehabilitation measures would include,

but not be limited to, fish passage improvements, instream structures using boulders and log placement to create spawning and rearing habitat, placement of fine and coarse materials for overwintering habitat, and riparian rehabilitation to establish or release existing trees.

## **Special Status And Supplemental Environmental Impact Statement Special Attention Species Habitat**

Management will be designed to protect, manage and conserve federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and bureau special status species policies. Management for the conservation of federal candidate and bureau sensitive species and their habitats will focus on not contributing to the need to list and to recover the species. Management for the conservation of state listed species and their habitats will be designed to assist the state in achieving management objectives.

Assessment species (which are of lesser concern) will be managed where possible so as to not elevate their status to any higher level of concern. Supplemental Environmental Impact Record of Decision special attention species will also be managed so as not to elevate their status to any higher level of concern.

Community structure, species composition, and ecological processes of special status plant and animal habitat will be maintained or restored.

The BLM will consult with or request technical assistance from the U.S. Fish and Wildlife Service or National Marine Fisheries Service for any proposed action which may effect federal listed or proposed species or their critical or essential habitat. Based on the results of consultation, the proposed action will be modified, relocated, or abandoned.

Table S-3 shows the numbers of special status plant and animal species that have been identified as inhabiting BLM-administered lands in the planning area.

The survey and manage provision of the Supplemental Environmental Impact Statement Record of Decision will be implemented within the ranges of its special attention species and the particular habitats that they are known to occupy.

**Table S-3. Special Status Species Found on BLM-Administered Lands.<sup>1</sup>**

	<b>Number of Plant Species</b>	<b>Number of Fish and Animal Species</b>
Federal Endangered	0	2
Federal Threatened	0	3
Federal Proposed	0	0
Federal Candidate	0	20
State Listed	1	27
Bureau Sensitive	1	29

<sup>1</sup>Does not include Supplemental Environmental Impact Statement special attention species.

Protection buffers will be provided for specific rare and locally endemic species and Supplemental Environmental Impact Statement Record of Decision special attention species in the upland forest matrix.

Establishment of Late-Successional/District Designated Reserves and other general allocations provide the framework for protection of the northern spotted owl. In addition 100 acres of the best northern spotted owl habitat as close as possible to a nest site or owl activity center in the Matrix will be retained for all known (as of January 1, 1994) spotted owl activity centers.

Known and potential habitat sites identified in the Pacific Bald Eagle Recovery Program would be protected. Management activity would be restricted within ¼ mile of bald and golden eagle nests between January 1 and August 31.

All management activities would be consistent with the Pacific Coast Recovery Plan for Peregrine Falcons. Buffers would be provided around known activity centers of peregrine falcons and northern goshawks.

A western sage grouse inventory plan would be developed and lek (breeding) sites and other important habitats for this bird would be protected. An inventory of Townsend's big eared bats would be conducted in all potential habitat. To protect the bats, human disturbance would be minimized in habitat used by the bat. Inventories will be conducted for both special status and non-status reptiles and amphibians in the planning area.

Aquatic species of special concern such as the short-nose sucker and Lost River sucker (endangered), and Klamath largescale sucker, redband trout, and

western pond turtle (candidates) will receive protection through the 300 foot buffers established by the Aquatic Conservation Strategy.

## Special Areas

Four areas, with approximately 8,200 acres, would be designated as areas of critical environmental concern. This would include one new research natural area. Two areas, with approximately 180 acres, would be designated environmental education areas. Three areas, with approximately 570 acres, would be designated special botanical/habitat areas.

## Cultural Resources Including American Indian Values

Prehistoric and historic sites would continue to be identified and managed for their public and scientific uses. Protection of cultural resources would be coordinated with the Klamath tribes and other interested parties through the development of memorandums of understanding with the relevant groups.

## Wild and Scenic Rivers

Eleven miles of the Klamath River would be found suitable for designation as a scenic river area under the Wild and Scenic Rivers Act.

## Visual Resources

Approximately 33,500 acres would be managed under Visual Resources Management Class II management (to retain scenic quality, landscape

## **Klamath Falls Resource Area Plan Summary**

alterations caused by management activities would not attract attention). An additional 81,800 acres of visually sensitive lands would be managed as Visual Resources Management Class III (to partially retain scenic quality, landscape alterations would not dominate the view).

## **Rural Interface Areas**

Visual resource management Class III management (and other special timber management practices) would be applied on 3,500 acres of BLM-administered lands within ¼ mile of private lands where county zoning allows for development on 1- to 20-acre lots.

## **Socioeconomic Conditions**

Management will contribute to local, state, national, and international economies through sustainable use of BLM-managed lands and resources and use of innovative contracting and other implementation strategies. It will also provide amenities (for example, recreation facilities, protected special areas and high quality fisheries) that enhance communities as places to live and work.

Bureau of Land Management timber management programs are expected to support 40 jobs and provide \$ 789,000 a year in personal income during the life of the plan. This is 130 jobs (76 percent) less than the average supported in the 1984-1988 period. Recreation activities on BLM-administered lands are expected to support 20 jobs which is no change from the 1984-1988 period.

The net decline in jobs cited above combines with an expected decline in jobs supported by the U.S. Forest Service, private, and other timber supplies. This would lead to substantial job losses in some communities in the planning area with consequent adverse effects on community stability.

Jobs are also supported by recreational fishing supported by BLM habitat. However, fishing opportunities related to BLM management are not expected to change in the next ten years.

## **Recreation**

Management will aim to provide a wide range of developed and dispersed recreation opportunities that contribute to meeting projected recreation demand within the planning area in a manner consistent with

BLM's Recreation 2000 Implementation Plan, the Supplemental Environmental Impact Statement Record of Decision, and the Oregon-Washington Public Lands Recreation initiative. Scenic, natural, and cultural resources will be managed to enhance visitor recreation experience expectations and produce satisfied public land users. Locally-sponsored tourism initiatives and community economic strategies will be supported by providing recreation projects and programs that benefit both short- and long-term implementation.

All fifteen developed and semi-developed recreation sites would remain open and would continue to be maintained. Two to sixteen additional sites would be constructed if funding becomes available.

The Gerber area watchable wildlife tour and Topsy Road would be nominated for designation as back country byways, and become components of the National Back Country Byway System.

As part of management for off-highway vehicles use, 4,300 acres would be closed year-round to vehicle use to protect other resource values, such as wildlife habitat and riparian-wetland areas. Use for administrative purposes, and authorized removal of commercial commodities, such as timber, could be excepted. Some 283 miles of road would be open and 150 miles open to limited use. Seasonal off-highway vehicle use limitations would continue in the Pokegama Wildlife Area and in the Klamath Deer Winter Range Area and new seasonal restrictions will be added on Bryant Mountain, Stukel Mountain and in the Gerber Block.

Demand for all recreation activities would be expected to increase during the life of the plan; however, the expected demand would be met for all activities. Additional emphasis would be placed on interpretive and informational signs and maps to support state and local strategies for encouraging tourism.

## **Timber Resources**

Management will provide a sustainable supply of timber and other forest products.

Lands available for scheduled timber harvest are as follows:



## Matrix Timber Allocations.

Land Use Allocation	Approx. Acres	
	West side	East side
Matrix (General Forest Management Areas-including visual resource management class II, rural interface, and TPCC restricted)	23,550	8,750

The annual Probable Sale Quantity from these allocations (both east and west sides) and the management planned for the Matrix is 1.11 million cubic feet (6.31 million board feet).

The Probable Sale Quantity for the Proposed Resource Management Plan is an estimate of annual average timber sale volume likely to be achieved from lands allocated to planned, sustainable harvest. The use of Probable Sale Quantity, rather than "Allowable Sale Quantity" recognizes uncertainties in the estimate. Harvest of this approximate volume of timber is considered sustainable over the long term based on the assumptions that the available land base remains fixed, and that funding is sufficient to make planned investments in timely reforestation, plantation maintenance, thinning, genetic selection, forest fertilization, timber sale planning, related forest resource protection, and monitoring.

The Probable Sale Quantity represents neither a minimum level that must be met nor a maximum level that cannot be exceeded. It is an approximation because of the difficulty associated with predicting actual timber sale levels over the next decade, given the complex nature of many of the standards and guidelines. It represents BLM's best assessment of the average amount of timber likely to be awarded annually in the planning area over the life of the plan, following a start-up period. The actual sustainable timber sale level attributable to the land-use allocations and management direction of the Proposed Resource Management Plan may deviate by as much as 40 percent from the identified Probable Sale Quantity.

Logging systems will be selected based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for protection of soil and water quality, and for meeting other land use objectives.

Uneven-age/multiple canopy management would be extensively used on both the west and east sides. To implement uneven-age management, most stands within the Klamath Falls Resource Area would be selectively harvested. The selection system is a method of uneven-age management involving the harvest of either single trees (single tree selection) or a group of trees (group selection) without harvesting the entire stand at any one time. Harvest would involve removing a proportion of trees across the entire diameter distribution every 10 to 20 years. Small, regeneration patchcuts (up to 5 acres), would be done to regenerate ponderosa pine and to encourage forage production for wildlife and for maintenance of early seral vegetative components. Post harvest stands would maintain an overstory component of 16 to 25 large green trees per acre on the west side and 5 to 10 large green trees per acre on the east side.

Silvicultural treatments and harvest designs will be based on the functional characteristics of the ecosystem and on the characteristics of each forest stand and site. Treatments will be designed, as much as possible, to prevent the development of undesirable species composition, species dominance, or other stand characteristics. The principles of integrated pest management and integrated vegetation management will be employed to avoid the need for direct treatments. Herbicides would be used only as a last resort.

Harvest of marketable hardwood stands will be planned in the same manner as conifer stands, if the land is not otherwise constrained from timber management. Volume from projected hardwood harvest is included in the probable sale quantity estimate. Where hardwood trees became established following previous harvest of conifers, reestablishing a conifer stand on the site will be planned.

Unscheduled harvests will occur from thinning and salvage in Late-Successional/District Designated Reserves and may occur from salvage in Riparian Reserves.

## Special Forest/Natural Products

The BLM will manage for the production and sale of Special Forest/Natural Products when demand is present and where actions taken are consistent with primary objectives for the land use allocation. The principles of ecosystem management will be used to guide the management and harvest of special forest products.

## Energy and Minerals

Management will maintain exploration and development opportunities for leasable and locatable energy and mineral resources.

Most BLM-administered lands would remain available for mineral leasing of oil and gas or geothermal resources and location of mining claims, but a variety of designations and allocations such as areas of critical environmental concern, Late-Successional/District Designated Reserves, and Riparian Reserves restrict exploration and development.

## Livestock Grazing

The Gerber Riparian Demonstration Project would continue. Grazing use (including but not limited to season of use, kinds and classes of livestock, numbers of animals, grazing capacity, and management facilities needed) would be adjusted based on and supported by the ongoing rangeland studies performed in accordance with appropriate guidance. An interdisciplinary team would review the results of these studies during the allotment evaluation process and make recommendations for changes to the Area Manager. This alternative would reduce the number of livestock authorized to use public land by approximately five percent.

## Land Tenure Adjustments

Land tenure adjustments will benefit a variety of uses and values, emphasizing opportunities that conserve biological diversity or enhance timber management opportunities. As a matter of practice, Oregon and California forest lands allocated to timber management would only be exchanged for lands to be managed for multiple-use purposes.

Lands are categorized in three land tenure adjustment zones:

- ♦ **Zone 1:** 186,000 acres retained under BLM administration.
- ♦ **Zone 2:** 3,000 acres where land ownership may be "blocked up" in exchange for other lands in Zones 1 and 2 with significant resource values.
- ♦ **Zone 3:** 23,000 acres where only lands with unique resource values would be retained; other lands in this zone would be exchanged, sold or transferred to another agency using appropriate disposal mechanisms.

## Roads

Road management will correct problems associated with high road density by emphasizing the reduction of minor collector and local road densities where those problems exist. Roads will be managed to meet the needs identified under other resource programs (for example, seasonal road closures for wildlife). In accordance with other management activities, road system management will have a goal of reducing open road density to 1.5 miles or less per section.

## Hydroelectric or Alternative Energy Projects

No action would be taken on the Salt Caves hydroelectric project until the Congress or Secretary of the Interior acts on the suitability of the Klamath River for designation as scenic under the Wild and Scenic Rivers Act. Issuance of a right-of-way grant for alternative energy projects would be possible if the proposed use would not significantly affect other resource uses.

## Monitoring the Resource Management Plan

Monitoring and evaluation of the resource management plan will be carried out at appropriate intervals for the following purposes:

- ♦ To be sure activities are occurring in conformance with the Resource Management Plan.
- ♦ To determine if activities are producing the expected results.
- ♦ To determine if activities are causing the effects identified in the environmental impact statement.

Consistency With State, Local, Tribal, and Other Federal Plans

The BLM planning regulations require that resource management plans be consistent with officially approved or adopted resource-related plans, and the policies and procedures therein, of the Federal agencies, state and local governments, and Indian tribes, so long as the guidance and resource management plans are also consistent with applicable Federal laws and regulations. The BLM has compared the Proposed Resource Management Plan with

a variety of such plans of other agencies. The Proposed Resource Management Plan appears to be consistent with all such plans, policies, and procedures, except perhaps the following:

- ◆ Possible cumulative effects of BLM and other landowners' activities in some watershed could lead to violation of the State of Oregon's antidegradation policy.
- ◆ Possible inconsistency with Oregon's Statutory Wildlife Policy, by maintaining some wildlife populations at less than optimum.
- ◆ Possible delay in reforestation beyond the one year required by the Oregon Forest Practices Act, due to the requirement for smoke management clearance before burning slash.
- ◆ Probable inconsistency with the Oregon Benchmarks for increasing standard of living, affordable housing, family stability, and stable home life.
- ◆ Inconsistency with Oregon statewide planning Goal 8 (Recreational Needs) due to possible failure to meet demand for off-highway vehicle use.
- ◆ Partial inconsistency with Oregon statewide planning Goal 9 (Economy of the State), due to reduced levels of BLM-resource-dependent employment and payments to counties.

some substantive recommendations led to changes in the Proposed Resource Management Plan or the analysis of environmental consequences. Any protests to the director of BLM will be reviewed and addressed before a record of decision on the Resource Management Plan is completed. Comments directly to the District Manager will also be considered in formulating the decision.

## Public Involvement

Public involvement has been an integral part of the BLM's resource management planning effort. Activities have included mailers or brochures, public meetings, open houses, field trips, distribution of planning documents and related comment periods, informal contacts, group meetings, written letters, and responses to comments.

Mailers requested comments on issue identification, development of planning criteria contained in state director guidance for the process, and BLM's analysis of the management situation which set the baseline for development of the draft Resource Management Plan/Environmental Impact Statement. Suggestions for formulation of the draft's Preferred Alternative were also requested.

The draft Resource Management Plan/Environmental Impact Statement was released for public review and comment in 1992. Comments were evaluated and

Table S-1. Comparisons of Allocations and Management by Alternative. <sup>1</sup>

		PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Water Quality and Riparian-Wetland Areas</b>				
Establishment of riparian management areas (average width in feet on each side of stream) <sup>2</sup>				
Stream Order:	1	N/A	75 <sup>4</sup>	See footnote 3
	2	N/A	75 <sup>4</sup>	See footnote 3
	3	N/A	105 <sup>4</sup>	See footnote 3
	4	N/A	150	See footnote 3
	5	N/A	210	See footnote 3
	6+	N/A	240	See footnote 3
Lakes, ponds, and other waters		N/A	150	See footnote 3
Riparian Reserves (width in feet on each side of stream)				
Fish bearing streams	300	N/A	N/A	
Lakes and natural ponds	300	N/A	N/A	
Permanently flowing non-fish-bearing streams	150	N/A	N/A	
Constructed ponds and reservoirs, and wetlands greater than one acre	150	N/A	N/A	
Seasonally flowing or intermittent streams	100	N/A	N/A	
Protected acres in RMAs - west side	N/A	2,452	See footnote 3	
Protected acres in Riparian Reserves - west	19,450	N/A	N/A	
Protected acres in RMAs - east side	N/A	1,517	See footnote 3	
Protected acres in Riparian Reserves - east	9,100	N/A	N/A	
Water quality protection	Restore and maintain the ecological health of watersheds & aquatic ecosystems contained within them on public lands through implementation of the Aquatic Conservation Strategy. The components of the Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration.	Provide substantial protection for wetlands including trout habitat, along selected streams, and other water environments.	Implement riparian requirements and enhancement projects.	

Table S-1

A	B	C	D	E
75	See footnote 5	See footnote 6	60	50
75	75	105	140	60
75	100	150	200	200
75	140	210	280	280
75	160	240	320	320
75	100	150	200	400
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
1,280	1,747	2,452	4,136	5,409
N/A	N/A	N/A	N/A	N/A
1,019	1,224	1,797	2,949	2,233
N/A	N/A	N/A	N/A	N/A
Meet legal requirements for protection of wetlands and water quality to protect trout habitat and other relevant values.	Meet legal requirements for protection of wetlands and water quality with moderate additional protection for trout habitat, other substantial streams, and other water environments.	Provide substantial protection for wetlands and riparian habitats, including trout habitat, along selected streams, and other water environments.	Provide substantial protection for wetlands and riparian zones along most streams and other water environments.	Manage all riparian zones and wetlands to maintain and improve water quality through protection of riparian native plant communities. Protect or enhance riparian zones to achieve a healthy and productive ecological condition for maximum long-term benefits and values.

Table 2-1. Comparisons of Allocations and Management by Alternative (continued)

	PRMP	DRMP Preferred	No Action
Livestock forage utilization	<p>Restore or maintain riparian-wetland areas so that 75 percent or more are in proper functioning condition by 1997. The overall objective is to achieve an advanced ecological status, except where resource management objectives, including proper functioning condition, will require an earlier successional stage, thus providing the widest variety of vegetation and habitat diversity for wildlife, fish, and watershed protection. Provide livestock forage consistent with the above.</p>	<p>Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient vegetation at the time of grazing for maintenance of plant vigor and streambank protection. Set specific utilization levels within selected riparian habitats that allow for the production of a moderate sustained yield of forage. Fence the following riparian areas to manage livestock use: Fall Creek, Tunnel Creek, and the unfenced portions of Long Prairie Creek and Hayden Creek.</p>	<p>Manage selected riparian habitats to enhance their vegetative characteristics through either fencing to control livestock use or by excluding livestock to allow vegetative recovery. Fence small riparian areas, such as springs and seeps when developed and provide stock water outside for livestock.</p>



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**A****B****C****D****E**

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Manage forage utilization by livestock in riparian zones to meet minimum water quality standards while maximizing forage production.

Manage forage utilization by livestock in riparian zones to meet minimum water quality standards while maximizing forage production consistent with other uses and values.

Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient maintenance of plant vigor and streambank protection. Set specific utilization levels within selected riparian habitats, that allow for the production of a moderate sustained yield of forage.

Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient maintenance of plant vigor and bank protection. Protect most riparian ecosystems through the use of intensive grazing management or by excluding livestock from those areas. Exclude Fall Creek and Tunnel Creek from livestock use.

Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient maintenance of plant vigor and streambank protection. Protect all riparian ecosystems either through the use of intensive grazing management or by excluding livestock. Exclude Fall Creek, Tunnel Creek, the class 3 stream in the Johnson Prairie Allotment, and Long Lake from livestock use.

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Old Growth and Mature Habitat</b>			
<b>West Side</b>			
Existing old growth (acres) excluded from timber harvest	4,526	1,235	135
Existing mature stands (acres) excluded from timber harvest	4,090	3,699	212
Total forest land (acres) excluded from planned timber harvest	17,837	11,016	9,790
Existing old growth (acres) managed for partial retention	143	2,238	0
Existing mature stands (acres) managed for partial retention	154	1,298	32
Total forest land managed for partial retention	1,257	5,691	2,560
<b>East Side<sup>7</sup></b>			
Existing old growth (acres) excluded from timber harvest	729	144	22
Existing mature stands (acres) excluded from timber harvest	1,420	401	64
Total forest land (acres) excluded from planned timber harvest	6,561	1,458	166
Existing old growth (acres) managed for partial retention	67	79	160
Existing mature stands (acres) managed for partial retention	380	566	576
Total forest land managed for partial retention	1,292	1,866	3,071

A	B	C	D	E
322	1,583	3,083	2,015	5,628
2,048	3,644	4,373	4,048	10,529
6,281	9,854	15,821	13,433	44,872
0	7	355	375	3
0	77	206	270	12
0	135	1,764	2,353	2,695
42	326	513	150	1,604
58	415	800	716	3,006
199	1,408	2,779	1,436	15,946
0	0	121	236	0
0	0	754	958	0
0	52	2,585	3,619	0

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Timber</b>			
<b>West Side</b>			
Forest management allocations (acres)			
Intensive	0	0	37,160
Restricted	23,563	36,634	2,560
Woodlands	0	0	0
Enhancement of other uses or not available (total)	24,059	11,016	9,790
Practices (assumed average annual acres for the first decade):			
Regeneration harvest unit (acres) <sup>a</sup>	131	127	1,610
(TRIM-PLUS harvest acres) <sup>a</sup>	(61)	(59)	See footnote 9
Commercial thinning/density management /uneven-age harvest units (acres) <sup>a</sup>	828	723	290
(TRIM-PLUS harvest acres) <sup>a</sup>	(385)	(336)	See footnote 9
Site preparation (pile & burn slash)	180	180	303
Vegetation control	200	250	189
Animal damage control	400	500	148
Pre-commercial thinning	50	50	220
Brushfield/hardwood conversion	0	30	0
Planting/regular stock	300	300	1,005
Planting/genetically selected stock	100	100	200
Fertilization	32	32	639
New road construction (miles/acres)	1/11	0.8/9	1.6/17
Pruning	16	16	0
PSQ sale quantity (mmbf)	5.91 <sup>10</sup>	4.5	19.0
PSQ sale quantity (mmcf)	1.03 <sup>10</sup>	.779	3.423

Table S-1

A	B	C	D	E
41,199	37,474	0	0	573
0	134	31,829	34,217	2,205
170	88	0	0	0
6,281	9,954	15,821	13,433	44,872
927	885	56	1,003	77
(547)	(461)	(31)	(444)	(35)
163	155	424	177	13
(96)	(81)	(238)	(78)	(6)
300	240	120	210	24
346	300	200	280	200
800	750	500	600	500
58	50	20	40	10
40	35	20	35	0
529	529	160	300	40
100	100	40	100	10
40	34	31	31	1
1.0/11	1.2/13	0.65/7	1.3/14	0.02/2
18	16	11	11	0
13.8	11.8	4.5	9.6	1.0
2.483	2.103	0.791	1.674	.182

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Timber</b>			
<b>East Side</b>			
Forest management allocations			
(acres)			
Intensive	0	0	17,674
Restricted	8,766	14,751	3,071
Woodlands	0	0	0
Enhancement of other uses			
or not available (total) <sup>11</sup>	82,464	60,984	54,990
Practices (assumed average annual			
acres for the first decade):			
Regeneration harvest units (acres) <sup>11</sup>	33	64	60
Commercial thinning/density			
management uneven age			
harvest units (acres)	269	516	540
Site preparation (pile & burn slash)	70	120	203
Vegetation control	25	28	0
Animal damage control	15	17	0
Pre-commercial thinning	20	17	50
Brushfield/hardwood conversion	0	22	0
Planting/regular stock	60	125	116
Planting/genetically selected			
stock	15	28	30
Fertilization	0	0	0
New road construction (miles/acres)	0.7/8	1.4/15	1.6/17
Pruning	13	13	0
PSQ sale quantity (mmbf)	0.40 <sup>10</sup>	1.29	1.40
PSQ sale quantity (mmcf)	0.08 <sup>10</sup>	0.248	0.270



Table S-1

A	B	C	D	E
15,978	14,717	0	0	0
0	52	13,398	14,741	231
3,959	3,959	0	0	0
55,798	60,966	62,337	60,994	75,504
60	58	53	58	1
564	524	474	522	8
200	160	80	140	16
33	25	25	25	0
25	20	15	20	15
20	15	15	15	0
40	20	20	30	0
105	116	2	110	
31	29	26	29	0
0	0	0	0	0
1.6/17	1.2/13	1.4/15	1.5/16	0.1/1
15	15	12	12	0
1.38	1.29	1.17	1.28	0.021
0.267	0.249	0.226	.248	0.004

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
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### Allocations/Management Actions by Alternative for Special Status (including Threatened and Endangered) Species and Supplemental Environmental Impact Statement Special Attention Species Habitat (Animals and Plants)

Conservation standards in addition to those common to all the alternatives.

Manage habitats of federal candidate state listed, state candidate, and Bureau sensitive species on all BLM-administered land.

Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species on all BLM-administered land.

Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species on all BLM-administered lands.

Implement standards and guidelines for SEIS special attention species.

Acres managed for all federal candidate category 1 and 2, state listed, and Bureau sensitive species

212,000

212,000

212,000

A	B	C	D	E
<p>Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species where such mitigation would not diminish commercial use.</p>	<p>On public domain lands: manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species.</p> <p>For O&amp;C lands: same as A, plus manage habitats of federal candidate, state listed, and Bureau sensitive species if known to occur only on BLM lands.</p>	<p>Areas that contain clusters of special status species are included where possible in restoration and retention areas for biological diversity.</p> <p>On public domain lands: manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species.</p> <p>For O&amp;C lands: Same as B.</p>	<p>Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species on all BLM-administered lands.</p>	<p>Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species on all BLM-administered lands.</p>
1,100	19,160	19,160	212,000	212,000

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Wildlife (including Fisheries) Habitat</b>			
Cavity dweller objective (percent of optimum woodpecker potential)	60	60	40
Dead and down woody material retained (tons/acre)	<p>West side: leave 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long</p> <p>East side: Retain, where available dead and down materials at approx. 5 tons per acre including 50 lineal feet of logs per acre greater than or equal to 12 inches in diameter and 8 feet long.</p>	<p>Mixed conifer/true fir: 10 tons per acre, including 2 pieces 20 inches in diameter and greater than 8 feet long and totalling at least 100 linear feet.</p> <p>Ponderosa Pine: 5 tons per acre including 3 pieces 12 inches in diameter and greater than 8 feet and totalling at least 50 linear feet.</p>	<p>West Side: 3 logs per acre, 24 inches diameter with length being the longest available.</p> <p>East Side: 6 logs per acre, at least 24 inches in diameter and 40 feet in length.</p>
<b>West Side</b>			
Seed (percent) harvested acres to legumes and/or grasses	up to 40	40	0
Wet meadows buffer width (in feet)	150	150	0

A	B	C	D	E
Leave all snags where consistent with safety consideration	40	60	Same as C	Same as C
None	None	<p>Mixed conifer/true fir: 10 tons per acre, including 2 pieces per acre, 20 inches in diameter and longer than 50 feet.</p> <p>Ponderosa Pine: 5 tons per acre including 3 pieces 12 inches in diameter and greater than 8 feet and totalling at least 50 linear feet.</p>	Same as C	Same as C
25	25	50	75	100
75	100	150	200	400

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Wildlife (including Fisheries) Habitat</b>			
Seasonal wetlands buffer width (in feet)	150	100	0
Cliffs/Talus slopes buffer width (in feet)	100	100	0
Dry meadows buffer width (in feet)	100	100	0
Wooded swamps buffer width (in feet)	150	100	0
<b>East Side</b>			
Seed (percent) harvested acres to legumes and/or grasses	40	40	0
Wet meadows buffer width (in feet)	150	150	0
Seasonal wetlands buffer width (in feet)	150	100	0
Cliffs/Talus slopes buffer width (in feet)	100	100	0
Dry meadows buffer width (in feet)	100	100	0
Wooded swamps buffer width (in feet)	150	100	0



A	B	C	D	E
75	100	150	200	400
25	50	75	100	100
25	50	75	100	100
50	75	100	100	100
25	25	50	75	100
75	100	150	200	400
75	100	150	200	400
0	25	50	75	100
25	50	75	100	100
50	75	100	100	100

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Special Areas</b>			
New RNA/ACECs designated	1	1	0
New other ACECs designated <sup>12</sup>	3	3	0
Acres in RNA/ACECs	520	500	0
Acres in other ACECs <sup>12</sup>	7,680	7,680	0

### Allocations/Management Actions by Alternative for Recreation

Sites available for recreation	15-50	5-21	3
Miles of maintained trails	8-118	2-53	1
Miles of road open year-round	283	292	371
Miles of road with OHV use limited	150	144	65
Miles of road closed year-round	44	41	41
Acres open year-round to OHV use	102,000	183,000	183,000
Acres with OHV use limited	105,600	90,000	27,500
Acres closed year-round to OHV use	4,300	3,000	1,500

Table S-1

A	B	C	D	E
0	1	1	1	1
0	3	4	8	8
0	0	500	500	500
0	7,680	8,300	9,100	9,100
3-12	5-17	5-20	8-24	8-24
2	2-18	2-55	3-55	3-55
477	477	292	244	244
0	0	144	172	172
0	0	41	61	61
211,700	211,700	108,000	45,000	45,000
300	300	101,000	144,000	144,000
3	3	3,000	23,000	23,000

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Wild and Scenic Rivers</b>			
River segments/miles found suitable for designation as Recreational	0/0	0/0	0/0
River segments/miles found suitable for designation as Scenic	1/11.0	1/11.0	1/11.0
River segments/miles found suitable for designation as Wild	0/0	0/0	0/0

### Allocations/Management Actions by Alternative for Visual Resources

Management Standards	<p>Manage as VRM Class II all BLM lands within ¼ mile of developed recreation sites, the Pacific Crest Trail, Spencer Creek, state scenic waterways and rivers designated scenic under the National Wild &amp; Scenic Rivers Act. No less than VRM Class III management would be provided within ¼ mile of rural interface areas and state and federal highways. The remaining lands would be managed as inventoried.</p>	<p>Manage as VRM Class II all BLM lands within ¼ mile of developed recreation sites, the Pacific Crest Trail, Spencer Creek, state scenic waterways and rivers designated under the National Wild and Scenic Rivers Act. No less than VRM Class III management would be provided within ¼ mile of rural interface areas and state and federal highways. The remaining lands would be managed as inventories.</p>	<p>Manage all BLM lands following VRM classes established in the Jackson-Klamath and Lost River Management Framework plans.</p>
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A	B	C	D	E
0/0	0/0	1/11.0	0/0	0/0
0/0	0/0	0/0	1/11.0	6/34.2
0/0	0/0	0/0	0/0	0/0
Manage available forest lands as VRM Class IV and all other lands as inventoried.	Manage available forest lands as inventoried within ¼ mile of recreation sites, state and federal highways and designated rivers.  Manage other available forest land as VRM Class IV. Manage all other lands as inventoried.	Same as A, except on available forest land where BLM-administered land is more than half of a viewshed, manage as inventoried.	Manage all lands as inventoried.	Same as D, except manage as VRM Class III all lands inventoried as Class IV, and manage as Class I all lands within ¼ mile of recreation sites, state and federal highways and designated rivers.



Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Visual Resources (continued)</b>			
<b>Acres managed</b>			
Visual Resource Management Class I	0	0	150
Visual Resource Management Class II	33,500	33,500	17,550
Visual Resource Management Class III	81,800	81,800	53,500
Visual Resource Management Class IV	96,700	96,700	140,800

**Allocations/Management Actions by Alternative for Cultural Resources**

Acres reserved as Native American traditional use areas	4,140	4,140	0
Acres nominated to National Register of Historical Places/#sites	5,000/50	175/25	0/0
Acres per year requiring cultural survey	4,500	2,930	0

Table S-1

A	B	C	D	E
0	0	0	0	3,800
22,600	28,900	32,800	34,600	68,400
49,800	52,100	62,100	81,100	139,800
139,600	131,000	117,100	96,300	0
1,180	1,680	4,140	5,640	7,140
0/0	14/2	175/25	560/80	840/120
2,790	2,750	2,930	3,270	2,316

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Land Tenure</b>			
Management direction	Make land tenure adjustment to benefit a variety of uses and values. Emphasize opportunities that conserve Biological Diversity, enhance ecosystem management or improve management efficiency.	Exchanges of O&C lands to conserve biological diversity or enhance timber management opportunities would be pursued. Public domain lands east of Highway 97 could be exchanged to conserve biological diversity or benefit one or more resources managed.  Public domain lands could be sold if they met FLPMA criteria.	Public lands could be exchanged for private lands where important resource values would be acquired or management efficiency would be increased.
Acres identified for retention (zone 1)	186,000	183,443	190,840
Acres potentially suitable for exchange only (zone 2)	3,000	22,880	16,640
Acres potentially suitable for sale or exchange (zone 3)	23,000	5,677	4,520

A	B	C	D	E
Exchanges could occur to enhance non-declining timber harvest level of the commercial forest lands. No commercial timber or range land could be sold or leased.	Exchanges of O&C or public domain lands could occur to emphasize opportunities primarily to enhance timber or grazing management opportunities. O&C or public domain lands, other than available commercial forest or grazing lands, could be sold if they met criteria of FLPMA sec. 203(a).	Same as B, except exchanges could be made to contribute to conservation of biological diversity.	Exchanges to acquire lands with non-timber non-grazing values would be emphasized. Lands other than available commercial forest or range lands could be sold if they met criteria (1) or (2) of FLPMA sec. 203(a).	Same as D
183,443	183,443	183,443	188,443	183,443
22,880	22,880	22,880	22,880	22,880
5,677	5,677	5,677	5,677	5,677

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Hydroelectric or Alternative Energy Projects</b>			
Right-of-way grant for the Salt Caves hydroelectric project	ROW would neither be accepted nor denied until Congress or the Secretary of the Interior acts on designation of the upper Klamath River.	ROW would neither be accepted nor denied until Congress acts on designation of the upper Klamath River	ROW would be denied
Right-of-way grant for pumped storage or alternative energy projects	ROW could be approved or denied	ROW could be approved or denied	ROW could be authorized

**Allocations/Management Actions by Alternative for Rights-of-Way**

Rights-of-way avoidance areas (acres) <sup>13/14</sup>	58,080	Same as Common	9,385
Rights-of-way exclusion areas (acres) <sup>13/14</sup>	840	Same as Common	0

**Allocations/Management Actions by Alternative for Access/Withdrawals**

Acquire access to public lands <sup>14</sup>	Acquire public access to public lands to assist various programs to meet management objectives.	Same as Common	Same as Common
Evaluation of withdrawals <sup>14</sup>	Protect lands with important resource values and/or significant levels of investment by withdrawing them from operation of the public land and mineral laws.	Same as Common	Same as Common

Table S-1

A	B	C	D	E
ROW would be issued	ROW would be issued	ROW would neither be accepted nor denied until Congress acts on designation of the upper Klamath River.	ROW would neither be accepted nor denied until Congress acts on designation of the upper Klamath River.	ROW would be denied
ROW would be issued	ROW would be issued	ROW could be issued	ROW could be issued	ROW would be issued
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common



Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Energy and Mineral Management</b>			
Acres available for oil and gas and geothermal leasing <sup>15</sup>	238,400	238,400	238,400
Acres closed to oil, gas and geothermal leasing	300	300	300
Acres open to mining claim location and operation	229,500	231,600	231,600
Acres closed to mining location <sup>16</sup>	6,400	4,300	4,300
Acres available for salable mineral disposal	222,500	223,000	233,900
Acres closed to salable mineral disposal	14,800	14,300	3,400

**Allocations/Management Actions by Alternative for Rural Interface Area Management**

Acres considered for alternative forest management practices	3,050	3,050	0
Acres where clearcutting and herbicide spraying excluded	0	0	0
Acres managed for VRM Class II objectives	0	0	0
Acres managed for VRM Class III objectives	3,050	3,050	0
Acres where prescribed burning excluded	0	0	0

Table S-1

A	B	C	D	E
238,400	238,400	238,400	238,400	238,400
300	300	300	300	300
231,600	231,600	231,600	231,600	231,600
4,300	4,300	4,300	4,300	4,300
230,300	221,400	220,200	219,600	204,900
7,000	15,900	17,100	17,700	32,400
0	2,800	3,050	3,050	4,500
0	2,800	3,050	3,050	4,500
0	0	0	3,050	4,500
0	2,800	3,050	0	0
0	0	0	3,050	0

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Livestock Grazing</b>			
Number of AUMs annually on 95 grazing allotments	12,978	12,978 <sup>17</sup>	13,662 <sup>17</sup>
Construct reservoirs (each)	68	51	0
Develop springs (each)	14	9	0
Miles of fence to build	58.5	41.5	0
Control competing vegetation (acres)	12,950	12,670	0

### Allocations/Management Actions by Alternative for Road Management

Construction (miles of road)	17	22	32
Motorized access	Allows motorized access	Allows motorized access	Allows for moderate access
Road closures	Limit open road densities to 1.5 miles per square mile.	Limit open road densities to 1.5 miles per square mile.	Provide moderate amount of seasonally and permanent road closures

A	B	C	D	E
16,894	14,140	12,503	11,406	9,649
55	51	51	48	44
9	9	9	9	9
28	34.5	43.5	42.5	38
12,370	12,630	12,670	12,670	11,490
26	24	21	28	1
Allows for substantial access	Allows for substantial access	Allows motorized access	Provides limited access	Provides limited access
Allowed where no conflict with timber production	Same as A	Same as DRMP Preferred	Same as DRMP Preferred	Same as DRMP Preferred

Table S-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Noxious Weed Control</b>			
Treatment of noxious weeds <sup>13</sup>	Follow Noxious Weed Control Final EIS 1986 and 1987. Follow current local plan and environmental assessment.	Same as Common	Same as Common

**Allocations/Management Actions by Alternative for Hazardous Materials**

Handling of hazardous materials <sup>13</sup>	Eliminate known hazardous materials on BLM-administered lands.	Same as Common	Same as Common
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**Allocations/Management Actions by Alternative for Fire**

Acres per year prescribed burning for site preparation and silvicultural hazard reduction	250	300	1,850
Acres per year prescribed burning for wildlife habitat and forage enhancement	740	740	200
Acres per year natural and/or artificial ignition prescribed fire for ecosystem enhancement	up to 7,500	6,500	0

A	B	C	D	E
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
2,200	2,200	200	350	40
740	730	740	720	650
0	0	6,500	8,100	10,300



Table S-1. Comparisons of Allocations and Management by Alternative (continued).

## Footnotes:

- <sup>1</sup> The Management Direction Common to Alternatives A through E does not in all cases apply to the Alternative No Action. More detail on management direction is provided in the text of Chapter 2 of the full document.. See below for abbreviations used in the table.
- <sup>2</sup> Order 1 and 2 perennial stream would have a 75-foot riparian management area.
- <sup>3</sup> No Action is based on stream classes not order. See Chapter 2 text.
- <sup>4</sup> Order 1, 2, and 3 fish-bearing streams would have a 150-foot riparian management area.
- <sup>5</sup> Riparian management area established on 1.5 miles of selected streams to protect beneficial uses.
- <sup>6</sup> Riparian management area established on 3.4 miles of selected streams to protect beneficial uses.
- <sup>7</sup> Does not include suitable woodlands (predominately juniper woodlands), for which no detailed inventory has yet been done.
- <sup>8</sup> See Appendix 4-C for explanation of the difference in acres between actual harvest and TRIM-PLUS harvest acres.
- <sup>9</sup> The Alternative No Action did not have Trim harvest acres under this plan.
- <sup>10</sup> The probable sale quantity shown may vary by plus or minus 40 percent due to changes resulting from further land classification, stream inventory, and watershed analysis. The acres associated with timber harvest activities would also vary by plus or minus 40 percent.
- <sup>11</sup> Each alternative includes juniper woodland as available for enhancement of other uses.
- <sup>12</sup> An "other area of critical environmental concern" is one that is not also a research natural area.
- <sup>13</sup> See Chapter 2 text for definitions of avoidance and exclusion area criteria.
- <sup>14</sup> See text in Common to Alternatives A through E.
- <sup>15</sup> There would be 1,400 acres less of geothermal resources throughout all alternatives.
- <sup>16</sup> An additional 1,500 acres closed to non-metalliferous mineral location throughout all alternatives.
- <sup>17</sup> AUM figure is a correction of incorrect totals found in the draft plan, not actual changes in grazing use.

### Abbreviations used in this table:

ACEC = area of critical environmental concern	AUM = animal unit month
DRMP = draft Resource Management Plan	FLPMA = Federal Land Policy and Management Act
MMBF = million board feet	MMCF = million cubic feet
N/A = Not Applicable	O&C = Oregon and California
OHV = off-highway vehicle	PRMP = Proposed Resource Management Plan
PSQ = probable sale quantity	ROW = right-of-way
RMA = riparian management area	RNA = research natural area
SEIS = Supplemental Environmental Impact Statement	VRM = Visual Resource Management



Table S-2. Summary of Environmental Consequences By Alternative.

Effects	Alternatives						
	NA <sup>1</sup>	A	B	C	D	E	PRMP <sup>2</sup>
Air Quality (tons of fuel burned <sup>3</sup> annually in prescribed fires, 10 years).	85,000	91,000	80,000	96,000	165,000	276,000	102,000
Water Quality (10 years) <sup>4</sup>							
Number of analytical watersheds probably improving <sup>5</sup>	3	3	3	3	3	3	3
Number of analytical watersheds probably declining	1	1	1	1	1	1	1
Dominant Woodpecker Populations (percentage of potential, 10 years).	54	45	46	53	61	57	52
Visual Resources (10 years) <sup>6</sup>							
VRM Class I	0	0	0	0	0	+	0
VRM Class II	0	-	-	0	+	+	+
VRM Class III	0	-	-	0	+	+	+
VRM Class IV	-	-	-	0	0	N/A	+
Wild and Scenic Rivers (study river segments, 10 years)							
Miller Creek (Scenic outstandingly remarkable value)	0	-	0	0	+	+	+
Barnes Valley Creek							
Fish outstandingly remarkable value)	0	0	0	0	0	0	0
Scenic outstandingly remarkable value)	0	-	-	0	0	+	0
Spencer Creek							
Fish outstandingly remarkable value	-	-	0	0	0	+	+
Scenic outstandingly remarkable value	0	-	-	0	0	+	+
Antelope Creek-segment A (Prehistoric)	0	0	0	0	0	+	0
Antelope Creek-segment C (Prehistoric)	0	0	0	0	0	+	0
Upper Klamath River-segment 2							
Historic outstandingly remarkable value	0	0	0	0	0	+	+
Prehistoric outstandingly remarkable value	0	-	-	0	0	+	+
Recreation outstandingly remarkable value	0	-	-	0	+	+	+
Scenic outstandingly remarkable value	0	-	-	0	0	+	+
Fish outstandingly remarkable value	0	0	0	0	0	0	0
Wildlife outstandingly remarkable value	0	-	-	0	+	+	+
Native American Traditional Use	0	-	-	0	+	+	+

Table S-2. Summary of Environmental Consequences By Alternative (Continued).

Effects	Alternatives						
	NA <sup>1</sup>	A	B	C	D	E	PRMP <sup>2</sup>
Recreation Use (capability to meet ten-year demand) <sup>7</sup>							
Off-road travel	Yes	Yes	Yes	Yes	No	No	Yes <sup>8</sup>
Nonmotorized travel	No	No	No	Yes	Yes	Yes	Yes
Camping	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Picnicking, studying nature, etc.	No	No	No	Yes	Yes	Yes	Yes
Boating	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Swimming, general waterplay	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Timber							
Annual long term sustained yield capacity (mmcf)							
West Side	3.423	2.483	2.103	0.791	1.674	0.182	1.028
East Side	0.270	0.267	0.249	0.226	0.248	0.004	0.078
Socioeconomic Conditions (10 years)							
Planning area jobs dependent on BLM timber production.	170	130	110	40	90	10	40
Planning area jobs dependent on recreation on BLM administered lands.	20	20	20	20	20	20	20
Planning area annuals personal income dependent on BLM timber production (\$ million, 1989 Dollars).							
Planning area annual personal income dependent on recreation on BLM-administered lands (\$ million).	3.397	2.508	2.124	0.801	1.697	0.184	0.789
Average annual O&C receipts distributed to all 130.00 counties (\$ million).	169.42	154.19	48.11	54.15	39.69	25.77	
Grazing (percentage of change).	0	+24	+3	-8	-16	-29	-5

1 NA = No Action

2 PRMP = Proposed Resource Management Plan

3 Ton of slash burned correlates directly with the level of omissions.

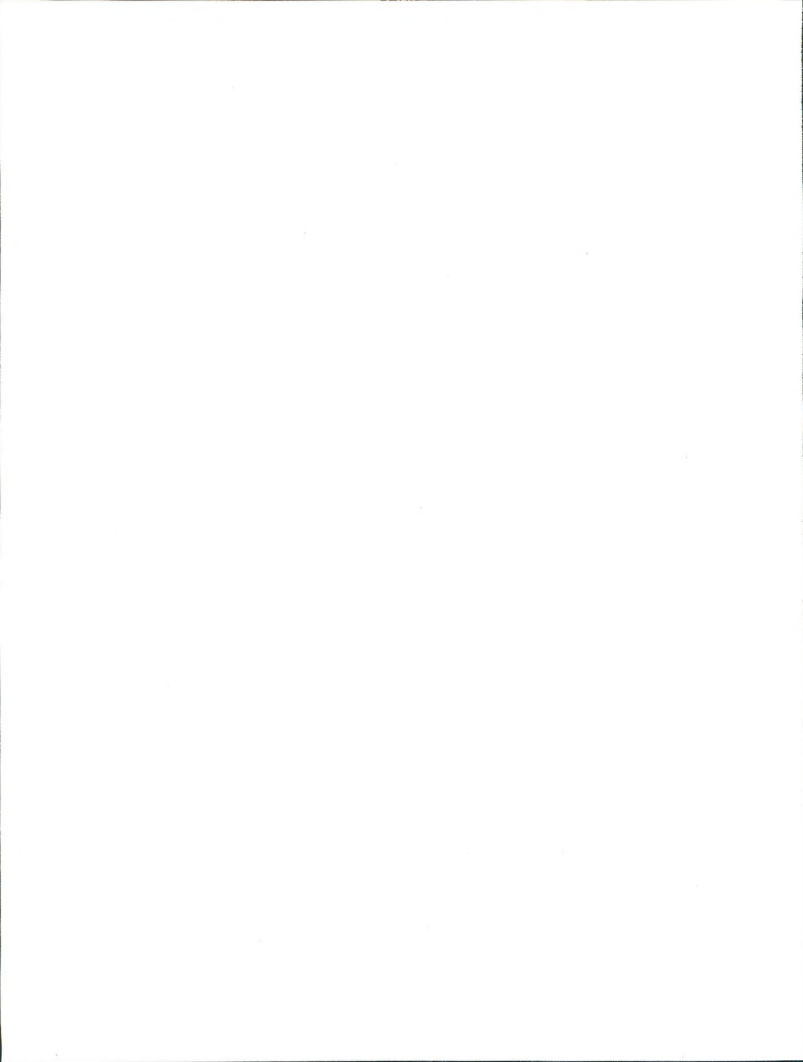
4 Cumulative effects, all ownerships.

5 The planning area was divided into five analytical watersheds. Four of those, where BLM administers substantial acreage, were analyzed.

6 + = Positive effect, - = negative effect, 0 = no change.

7 Yes, use would be met; No, use would not be met: For uses not listed, projected 10 year demand would be met under all alternatives.

8 Possibly met.

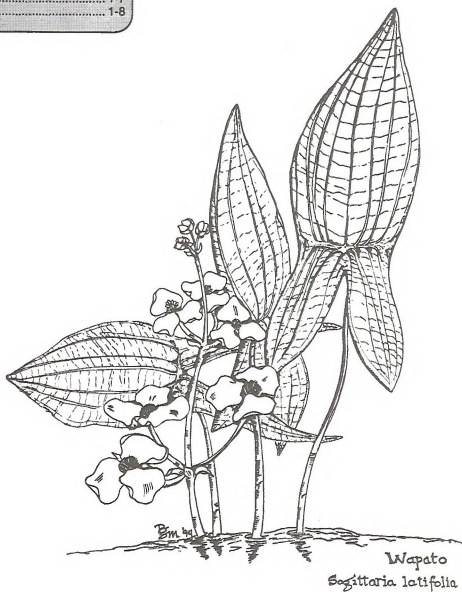


# Chapter 1

## Introduction

### Contents

Introduction .....	1-3
The Planning Area .....	1-3
Purpose and Need for the Action .....	1-3
Relationship of the Resource Management Plan to BLM Policies, Programs, and Other Plans .....	1-5
Planning Process and Criteria .....	1-6
Issues .....	1-6
Issues, Concerns and Other Planning Considerations Eliminated from Detailed Study .....	1-7
Western Oregon Digital Database .....	1-7
Subsequent Chapters .....	1-8



Wapato  
*Sagittaria latifolia*





## Introduction

This resource management plan/environmental impact statement evaluates alternative land use plans and associated impacts for the management of 212,000 acres of land and its resources that are administered by the U.S. Department of the Interior, Bureau of Land Management's (BLM) Klamath Falls Resource Area of the Lakeview District. Each alternative presented in Chapter 2 and analyzed in detail represents a complete and reasonable plan that could be used to guide the management of the area covered by this plan.

## The Planning Area

The BLM-administered lands in the Klamath Falls Resource Area are located in southern Klamath County, on the eastern slope of the Cascade Range (see Map 1-1 in the map packet). For purposes of this document the planning area and the resource area are equivalent, although planning decisions pertain only to BLM-administered lands in the planning area.

The public land acquired at the mouth of the Wood River is not included in this document. A separate Resource Management Plan is being developed for the Wood River property. This Upper Klamath Basin Draft Resource Management Plan/Environmental Impact Statement was released for public review in March 1994, and a Final Resource Management Plan for the Wood River property will be completed in 1995.

In addition to the 212,000 BLM-administered surface acres, there are 21,000 acres of non-federally-owned surface land underlain by subsurface federal mineral estate within the planning area that are also administered by the BLM. In these areas, the Resource Management Plan/Environmental Impact Statement only addresses the minerals, not the non-BLM-administered surface over those minerals. The lands west of Highway 97, referred to in this document as the west side, are primarily revested Oregon and California grant lands (46,000 acres of Oregon and California land out of a total of 51,000 acres of BLM-administered lands on the west side). The lands east of Highway 97, referred to in this document as the east side, are known as public domain lands (161,000 acres). The definition of east and west side lands is slightly different than this for purposes of discussion and analysis in the timber section. Map 1-2 in the map packet shows the general land status within the planning area. Other major federal lands within the planning area include portions of the Rogue River,

Fremont, and Winema National Forests and the Klamath Basin National Wildlife Refuge.

Briefly listed below are some of the distinctive features that characterize the Klamath Falls Resource Area. The Klamath Falls Resource Area lies within the geographic area called the Klamath Basin. Water in the planning area drains into the upper Klamath River and the Lost River drainage. The west side is predominantly a mixed conifer species consisting of ponderosa pine, white fir, Shasta red fir, sugar pine, western white pine, and Douglas fir. The east side is partially forested with ponderosa pine. The remaining east side lands are juniper woodlands and range lands. The major population is centered in and around the City of Klamath Falls.

## Purpose and Need for the Action

As discussed in the *Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern spotted Owl* (hereafter referred to as the Supplemental Environmental Impact Statement), the Proposed Resource Management Plan responds to dual needs: the need for forest habitat and the need for forest products.

The need for forest habitat is the need for a healthy forest ecosystem with habitat that will support populations of native species and includes protection for riparian areas and waters. This need was reflected by President Clinton at the April 2, 1993, Forest Conference in Portland, Oregon.

The need for forest products from forest ecosystems is the need for a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies and contribute valuable resources to the national economy, on a predictable and long-term basis. This need also was reflected by President Clinton at the Forest Conference.

The Proposed Resource Management Plan identified in this document was developed after consideration of the following:

- ◆ Public comments at open house meetings and in correspondence;
- ◆ comments from other government agencies;
- ◆ BLM staff analysis of the consequences of alternatives;

- ◆ legal mandates of Federal laws and executive orders
- ◆ decisions made in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and its Attachment A (hereafter referred to as the Supplemental Environmental Impact Statement Record of Decision); and
- ◆ requirements of Bureau policy

The resource management plan was developed under the requirements of the Federal Land Policy and Management Act through the use of an interdisciplinary planning process. This document (Resource Management Plan/Environmental Impact Statement) is written in compliance with the National Environmental Policy Act and related Council on Environmental Quality regulations.

A list of the major Federal laws and executive orders affecting BLM land management in western Oregon is provided in Appendix A.

The management of the Oregon and California lands is governed by a variety of statutes, including the Oregon and California Lands Act, Federal Land Policy and Management Act, the Endangered Species Act, and the Clean Water Act. The Oregon and California Lands Act requires the Secretary of the Interior to manage Oregon and California lands for permanent forest production; however, such management must also be in accord with sustained-yield principles. Further, that Act requires that management of Oregon and California lands protect watersheds, regulate streamflow, provide for recreational facilities, and contribute to the economic stability of local communities and industries. The Act does not require the Secretary to harvest all old growth timber or all commercial timber as rapidly as possible or according to any particular schedule. The Secretary has discretion to determine how to manage the forest on a sustained-yield basis that provides for permanence of timber production over a long-term period. The Secretary must necessarily make judgments, informed by as much information as possible, about what kind of management will lead to permanent forest production that satisfies the principle of sustained yield.

Oregon and California lands must also be managed in accordance with other environmental laws such as the Endangered Species Act and the Clean Water Act. Some provisions of these laws take precedence over the Oregon and California Lands Act. For instance, the Endangered Species Act requires the

Secretary to ensure that management of Oregon and California lands will not likely result in jeopardy to listed species or destruction or adverse modification of critical habitat. The Endangered Species Act directs the Secretary and all federal agencies to utilize their authorities to carry out programs for the conservation and recovery of listed species. Section 5(a) of the Act also directs: "the Secretary, and the Secretary of Agriculture with respect to the National Forest System, shall establish and implement a program to conserve fish, wildlife, and plants, including those which are listed as endangered species or threatened species pursuant to Section 4 of this Act." 16 U.S.C. 1534(a). Although several northern spotted owl recovery plans have been proposed, the Secretary has not yet adopted final recovery plans for either the northern spotted owl or the marbled murrelet. The Supplemental Environmental Impact Statement Record of Decision's late-successional and riparian reserve concepts are important building blocks in the development of recovery plans to achieve the conservation and recovery of those species.

One of the purposes of the Endangered Species Act is the preservation of ecosystems upon which endangered and threatened species depend. A forward-looking land management policy would require that federal lands be managed in a way to minimize the need to list species under the Endangered Species Act. Additional species listings could have the effect of further limiting the Oregon and California Lands Act's goal of achieving and maintaining permanent forest production. This would contribute to the economic instability of local communities and industries, in contravention of a primary objective of the Congress in enacting the Oregon and California Lands Act. That Act does not limit the Secretary's ability to take steps now that would avoid future listings and additional disruptions.

Protection of watersheds and regulating streamflow are explicit purposes of forest production under the Oregon and California Lands Act. Riparian reserves, including those established on Oregon and California lands under the Proposed Resource Management Plan, are designed to restore and maintain aquatic ecosystem functions. Together with other components of the Aquatic Conservation Strategy, Riparian Reserves will provide substantial watershed protection benefits. Riparian Reserves will also help attain and maintain water quality standards, a fundamental aspect of watershed protection. Both Riparian Reserves and Late-Successional Reserves will help regulate streamflows, thus moderating peak streamflows and attendant adverse impacts to watersheds.

## **Relationship of the Resource Management Plan to BLM Policies, Programs, and Other Plans**

The BLM in Oregon is developing five other resource management plans concurrently with the development of this one. Together, the six resource management plans cover all BLM-administered lands in western Oregon. Some lands administered by the Medford District to the west in Oregon and the Ukiah District to the south in California are adjacent to lands addressed in the Klamath Falls Resource Area plan. Management of certain resources or administrative features, such as watersheds and road networks, in these districts is shared with the Klamath Falls Resource Area. Coordination and cooperation for management of these lands is occurring in the planning process.

The draft Resource Management Plan/Environmental Impact Statement was supplemented by the Supplemental Environmental Impact Statement. The Supplemental Environmental Impact Statement Record of Decision, signed jointly by the Secretary of the Interior and the Secretary of Agriculture, requires the Bureau to incorporate the land-use allocations and standards and guidelines in that decision in the Bureau's Resource Management Plans for western Oregon. The Proposed Resource Management Plan is intended to be consistent with the Supplemental Environmental Impact Statement Record of Decision; any apparent inconsistencies are oversights or misinterpretations of Supplemental Environmental Impact Statement Record of Decision language. The Final Supplemental Environmental Impact Statement describes the environmental impacts which arise from those directions. This Final Environmental Impact Statement for the Resource Management Plan incorporates the analysis in that Final Supplemental Environmental Impact Statement.

In 1987, the BLM completed a Record of Decision for its Northwest Area Noxious Weed Control Environmental Impact Statement. Appendix 1-B of the draft Resource Management Plan/Environmental Impact Statement contained a copy of key elements of the Record of Decision for noxious weed control. This Resource Management Plan/Environmental Impact Statement is tiered to that Environmental Impact Statement, and the decisions made in the Noxious Weed Control Record of Decision are not addressed again in the Resource Management Plan/Environmental Impact Statement alternatives.

This Resource Management Plan/Environmental Impact Statement is similarly tiered to the BLM Western Oregon - Management of Competing Vegetation Environmental Impact Statement (1989), regarding analysis of impacts of vegetation management activities on human health, as well as all other impacts from the use of herbicides in management programs other than noxious weed control. Appendix 1-C of the draft Resource Management Plan/Environmental Impact Statement contained a copy of the key elements in the Record of Decision for the Vegetation Environmental Impact Statement. The decisions made in that Record of Decision are also not readdressed.

This Resource Management Plan/Environmental Impact Statement is also tiered to the 1993 Environmental Impact Statement, Pacific Yew, prepared by the U.S. Forest Service, with BLM as a cooperating agency, regarding analysis of impacts of harvest of Pacific yew. A copy of the key elements of the Record of Decision for that Environmental Impact Statement is included as Appendix B of this document. The decisions made in that Record of Decision are not readdressed.

The BLM's Final Oregon Wilderness Environmental Impact Statement, published in December 1989, addresses the Mountain Lakes Wilderness Study Area in the Klamath Falls Resource Area, and will lead to recommendations to Congress regarding designation of these areas. Pending Congressional action, the wilderness values in this area will be protected. This Resource Management Plan/Environmental Impact Statement addresses options for management of these wilderness study areas should the Congress choose not to designate them as wilderness.

This Resource Management Plan/Environmental Impact Statement incorporates by reference the analyses and decisions made in the following documents: the 1994 Programmatic Supplemental Environmental Impact Statement (currently between final and record of decision), Animal Damage Control; the 1987 Lakeview District Animal Damage Control Environmental Assessment; the 1993 Gopher Control Environmental Assessment; the 1987 Programmatic Final Environmental Impact Statement on Grasshopper Control; and the 1993 Grasshopper Control Environmental Assessment covering Lake and Klamath Counties. In addition, a new regional predator control environmental assessment for southwestern Oregon is being prepared by the Animal and Plant Health and Inspection Service, with the BLM as a cooperating agency.

## Chapter 1 - Introduction

Any finding made in the record of decision for this Resource Management Plan/Environmental Impact Statement that certain river segments studied herein are suitable for designation under the Wild and Scenic Rivers Act, will be a preliminary administrative finding. It will receive further review and possible modification by the Director, BLM; Secretary of the Interior; or the President of the United States. Final decisions have been reserved by Congress unless the Governor nominates a river to the Secretary of the Interior, who may then decide to designate it. In May 1993, the Governor of Oregon petitioned the Secretary of the Interior to designate the upper Klamath River. The National Park Service prepared a report and environmental assessment which is in the process of being finalized. No further action has occurred.

## Planning Process and Criteria

The BLM's planning process involves nine steps as shown below:

1. Identify Issues, concerns, and opportunities.
2. Develop planning criteria.
3. Collect inventory data and information.
4. Analyze the management situation.
5. Formulate alternatives.
6. Estimate effects of alternatives.
7. Select the preferred alternative.
8. Select the resource management plan.
- 8a. Publish Proposed Resource Management Plan/final Environmental Impact Statement.
- 8b. Respond to any protests and publish Resource Management Plan/record of decision.
9. Implement, monitor, and evaluate the Resource Management Plan.

Step 7 also includes publication of the draft Resource Management Plan/Environmental Impact Statement. Public involvement has occurred at several steps in the process.

The planning process was designed to help the BLM identify and consider those uses on BLM-administered land that the public is interested in, to the extent consistent with Congressional laws and federal land management policies.

The Oregon BLM's State Director developed planning criteria to prepare this and the other five western Oregon resource management plans. The State Director's Guidance and the criteria for formulation of alternatives are in Appendix C.

## Issues

Several issues and concerns were identified through public involvement in the early phases of the planning process. Of particular relevance to the planning effort were public responses to scoping mailers that five districts sent out in September 1986. At this time the Klamath Falls Resource Area was not part of the western Oregon planning process. The Klamath Falls Resource Area scoping mailer went out in May 1989. The issues and concerns identified from the 1986 mailer are as follows:

- ♦ Timber production practices
- ♦ Old growth forests and habitat diversity
- ♦ Threatened and endangered species
- ♦ Special areas
- ♦ Visual resources
- ♦ Watershed management
- ♦ Streams, riparian areas, and water quality
- ♦ Recreation resources and tourism
- ♦ Land tenure and access
- ♦ Rural residential management areas (Rural interface areas)

Three additional issues (the last two in the list are specific to the Klamath Falls Resource Areas) were identified after these mailers were sent. These issues include:

- ♦ Wild and scenic rivers;
- ♦ the Salt Caves hydroelectric project; and
- ♦ livestock grazing



## Issues, Concerns, and Other Planning Considerations Eliminated from Detailed Study

The alternatives addressed in the supplemental environmental impact statement but not selected in the Supplemental Environmental Impact Statement Record of Decision, were eliminated from district-specific study because they were adequately considered in the Supplemental Environmental Impact Statement.

Mineral resources were eliminated from consideration as a primary issue in the formulation of alternatives because mineral development activity on BLM-administered lands in the Klamath Falls Resource Area has been insignificant in recent years and is expected to remain minor during the life of this plan.

The following topics were eliminated from study, for the reasons described:

**Use of herbicides** - This topic was fully analyzed in BLM's 1989 Environmental Impact Statement, Western Oregon - Management of Competing Vegetation, and BLM's 1986 Environmental Impact Statement, Northwest Area Noxious Weed Control, as supplemented in 1987.

**Effects on agriculture** - BLM activities in the planning area are not expected to have measurable effects on agriculture (this does not include livestock grazing which is discussed). Water rights are administered by the State of Oregon. The Bureau of Reclamation has the majority of water rights for agricultural purposes in the Klamath Basin; whereas the BLM owns a relatively minor amount of water rights, which are used primarily for wildlife purposes.

The following effects, sometimes perceived as relevant planning topics, were eliminated from study for the reasons described:

- ◆ Effects on prime and unique farm lands and paleontological resources - No discernable effects are anticipated in the Klamath Falls Resource Area.
- ◆ Effects on off-reservation Indian tribal treaty rights or trust resources. - No such treaty rights

or trust resources involve BLM-administered lands in the Klamath Falls Resource Area.

- ◆ Effects on energy use - Previous analyses (such as the Jackson-Klamath Timber Management Environmental Impact Statement) have shown that effects of BLM management activities in the planning area are not significant.

## Western Oregon Digital Database

The BLM developed the Western Oregon Digital Database, a geographic information systems digital (computer) database, to support the resource management plan process. Due to the checkerboard pattern of land ownership, base data themes (transportation, gross vegetation, hydrology, topography, and cultural features) were mapped on 7 million acres to obtain coverage of the BLM's 2.4 million acres in western Oregon. This acreage only covers the western half of the Klamath Falls Resource Area; the east side of the planning area was manually generated. All base themes were derived from 1985-1986 aerial photography and were then digitized at 1:4,800 scale using automated digitizing system software. Base theme mapping is complete, except for topography.

In addition to the base data themes, resource data themes, including soils, forestry, big game, minerals, watersheds, northern spotted owl sites, and recreation sites and areas were mapped. There are approximately 75 resource themes, at a scale of 1:12,000 or more depending on the theme, captured on the 2.4 million acres of BLM-administered lands. It is anticipated that additional themes will be added to meet future day-to-day resource management operational needs.

The BLM ownership is based on the geographic coordinate database system and maps were generated from this information directly in the automated digitizing system. Because these acreages are computer-generated, they may differ from figures displayed in other documents, which were determined from BLM master title plats. Lands east of Highway 97 are manually-generated from the master title plats, as those lands were not digitized.

The BLM is using geographic information system technology based on the Map Overlay and Statistical System family of software on Prime computers in the

## **Chapter 1 - Introduction**

six western Oregon districts and the State Office in Portland. Many base and resource themes have database information associated with them. The database information is stored in attribute files, which are in turn linked to the graphic files by a process called DBLINK.

To build the Western Oregon Digital Database database, standards for each of the themes were developed and agreed upon by the BLM's western Oregon districts. The Western Oregon Digital Database Data Entry Handbook was developed with district input to provide a comprehensive and concise set of instructions, including quality control assurance, so that the data themes are standard from district to district.

There are actually two Western Oregon Digital Database databases: one for doing the resource management plans, in which the data is "frozen" in time; and one for operational uses, in which the data will be updated. Updating the Western Oregon Digital Database data is important because of the high frequency of changes that need to be made for many of the resource themes, particularly roads and operations inventory.

The Western Oregon Digital Database database has been used in three ways in the planning effort:

- ◆ To compute and aggregate resource data for each planning area, and to display maps of that data;
- ◆ To help design alternatives in accordance with criteria established for alternative formulation and to display maps of those alternatives; and
- ◆ To facilitate analysis of some of the consequences of those alternatives.

## **Subsequent Chapters**

The following three chapters describe the proposed resource management plan, the environment where that management scheme would be applied, and the effects to the areas resources that the alternative would have if approved for implementation.

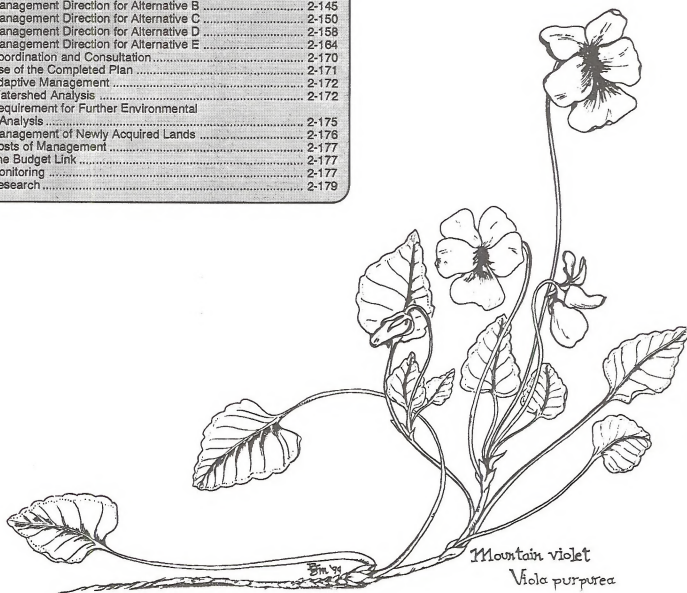


# Chapter 2

## Description of the Alternatives

### Contents

Major Changes from Chapter 2 of the Draft	
Resource Management Plan .....	2-2
Introduction .....	2-2
The Proposed Resource Management Plan .....	2-2
Land Use Allocations and Resource Programs .....	2-6
Management Direction Common to	
Alternatives A through E .....	2-118
Management Direction for the Alternative	
No Action .....	2-135
Management Direction for Alternative A .....	2-143
Management Direction for Alternative B .....	2-145
Management Direction for Alternative C .....	2-150
Management Direction for Alternative D .....	2-158
Management Direction for Alternative E .....	2-184
Coordination and Consultation .....	2-170
Use of the Completed Plan .....	2-171
Adaptive Management .....	2-172
Watershed Analysis .....	2-172
Requirement for Further Environmental	
Analysis .....	2-175
Management of Newly Acquired Lands .....	2-176
Costs of Management .....	2-177
The Budget Link .....	2-177
Monitoring .....	2-177
Research .....	2-179



# Major Changes from Chapter 2 of the Draft Resource Management Plan

The Proposed Resource Management Plan, which is consistent with the Supplemental Environmental Impact Statement Record of Decision, replaces the draft Resource Management Plan/Environmental Impact Statement's Preferred Alternative.

The description of the Proposed Resource Management Plan includes objectives, land use allocations, and management actions/direction in one location for reader convenience.

The Klamath Falls Resource Area draft Preferred Alternative's Protected Habitat Areas have become unmapped Late-Successional/District Designated Reserves in the Proposed Resource Management Plan/Environmental Impact Statement. The Protected Habitat Area Buffers are still a part of the Matrix, but retain the resource area's special management restrictions. The Protected Habitat Area Buffers are now called Late-Successional/District Designated Reserve Buffers. The Aquatic Conservation Strategy has been applied to the east side lands of the Klamath Falls Resource Area.

## Introduction

The purpose of this Chapter is to describe the Klamath Falls Resource Area Proposed Resource Management Plan and the other land and resource management alternatives that were analyzed by the Bureau of Land Management. The first section of the Chapter is a description of the objectives, major land use allocations, and management actions/directions for the Proposed Resource Management Plan. The second section is a description of six other management alternatives.

Except for Table 2-1, the alternative comparison tables in Chapter 2 in the draft Resource Management Plan are not duplicated in this document. Table 2-1 and 2-13 are located at the end of the Proposed Resource Management Plan section; all other tables are located as close to the reference point as possible. All Chapter 2 maps are located in the accompanying packet.

# The Proposed Resource Management Plan

The Proposed Resource Management Plan was developed partially in response to public comments related to the Bureau of Land Management's August 1992 draft Resource Management Plans for western Oregon. In addition the proposed plan incorporates the land use allocations and management direction from the Supplemental Environmental Impact Statement Record of Decision.

Two maps showing the land allocations of the Proposed Resource Management Plan are the Western Oregon Planning Strategy and the District Planning Strategy (see Maps 2-1 and 2-2 in the accompanying map packet).

In the Klamath Falls Resource Area, all references to Late-Successional/District Designated Reserves are for reserves that were unmapped in the Supplemental Environmental Impact Statement.

Also, the Matrix in the Klamath Falls Resource Area is designed to provide connectivity and biological diversity across the landscape rather than in connectivity/diversity blocks.

Much of the BLM-administered land in the Klamath Falls Resource Area was not covered by the Supplemental Environmental Impact Statement because it is outside the range of the northern spotted owl. However, an effort similar to the western Oregon Supplemental Environmental Impact Statement process is currently in progress for eastern Oregon (called the Eastside Ecosystem Management Project). An environmental impact statement is being developed, but a draft environmental impact statement has not been released yet. In the Klamath Falls Resource Area, any requirements, goals, and objectives devised as a result of the Eastside Ecosystem Management Project's future environmental impact statement record of decision will be incorporated into the resource area's management programs as appropriate.

## Vision

The Bureau of Land Management will manage the natural resources under its jurisdiction in western Oregon to help enhance and maintain the ecological health of the environment and the social well being of human populations.

There are several basic principles supporting this vision:

- ◆ natural resources can be managed to provide for human use and a healthy environment;
- ◆ resource management must be focused on ecological principles to reduce the need for single resource or single species management;
- ◆ stewardship, the involvement of people working with natural processes, is essential for successful implementation;
- ◆ the Bureau of Land Management cannot achieve this vision alone, but can, by its management processes and through cooperation with others, be a significant contributor to its achievement; and
- ◆ a carefully designed program of monitoring, research, and adaption will be the change mechanism for achieving this vision.

## Strategy

Lands administered by the Bureau of Land Management will be managed to maintain healthy, functioning ecosystems while providing a sustainable production of natural resources. This management strategy, titled ecosystem management, involves the use of ecological, economic, social, and managerial principles to ensure the sustained condition of the whole. Ecosystem management emphasizes the complete ecosystem instead of individual components and looks at sustainable systems and products that people want and need. It seeks a balance between maintenance and restoration of natural systems and sustainable yield of resources. It is based on the premise that economic health can not be sustained without ecological health.

The building blocks for this strategy are comprised of several major land use allocations - Riparian Reserves, Late-Successional/District Designated Reserves, Adaptive Management Areas (name of which occur in the Klamath Falls Resource Area, Matrix which includes General Forest Management Areas, and Connectivity/Diversity Blocks (none of which occur in the Klamath Falls Resource Area. The Matrix in the Klamath Falls Resource Area is designed to provide connectivity and biological diversity across the landscape rather than in large connectivity/diversity blocks. These land use allocations are located and configured in the landscape to support overall ecosystem function and to meet the Vision for

management of federal lands in Oregon. There are a variety of special purpose management areas such as recreation sites, wild and scenic rivers, and visual resource management areas.

Each land use allocation will be managed according to specific objectives and management actions/direction. During initial implementation of the plan, the stated objectives and management actions/direction will provide the rules and limits governing actions and the principles specifying the environmental conditions or levels to be achieved and maintained. As the BLM gains experience in implementing the plan and applying the concepts of adaptive management, the stated objectives and management actions/direction will be refined for specific geographic areas.

There are two major management concepts underlying the objectives and management actions/direction - Ecological Principles for Management of Late-Successional Forests and the Aquatic Conservation Strategy. These concepts are summarized below.

## Ecological Principles for Management of Late-Successional Forests

One goal of this plan is to maintain late-successional and old growth species habitat and ecosystems on federal lands. A second goal is to maintain biological diversity associated with native species and ecosystems in accordance with laws and regulations.

All land use allocations described in this plan will contribute to these two goals. For instance, Late-Successional/District Designated Reserves and Riparian Reserves and many special areas (for example, some areas of critical environmental concern) will be managed to enhance and/or maintain late-successional forest conditions. The Matrix will be managed to retain late-successional forest legacies while providing diversity (for example, coarse woody debris, large green trees, snags, and late-successional forest patches). These and other land use allocations and resource programs are described in detail below.

See the Supplemental Environmental Impact Statement Record of Decision (Appendix D) for additional information about ecological principles for management of late-successional forests.

## Aquatic Conservation Strategy

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands.

The Aquatic Conservation Strategy is designed to meet the following objectives:

- ◆ Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.
- ◆ Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.
- ◆ Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
- ◆ Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
- ◆ Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
- ◆ Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing (that is, movement of woody debris through the aquatic system). The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
- ◆ Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

- ◆ Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
- ◆ Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

The components of the Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration.

### Riparian Reserves

Riparian Reserves are lands along streams and unstable and potentially unstable areas where special standards and guidelines direct land use.

See Riparian Reserves in Appendix D.

### Key Watersheds

Key Watersheds are a system of large refugia that are crucial for maintaining and recovering habitat for at-risk stocks of resident fish species. These refugia include areas of high quality habitat and areas of degraded habitat. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat have high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program (see the Watershed Restoration section that follows).

There are two types of Key Watersheds - Tier 1 and Tier 2. Tier 1 watersheds contribute directly to conservation of at-risk fish species. They also have a high potential of being restored as part of a watershed restoration program. Tier 2 watersheds do not contain at-risk fish stocks, but they are important sources of high quality water.

Key Watersheds in the resource area are Spencer Creek (Tier 1 - approximately 40,850 acres of public and private land), Clover Creek (Tier 2 - approximately 13,950 acres of public and private land), and a portion of (Johnson Creek) Jenny Creek (Tier 1 - approximately 133,000 acres of public and private land). See Map 2-1 for locations of Key Watersheds.



Key Watersheds overlay portions of most land use allocations in the resource area and place additional management requirements or emphasis on activities in those areas.

### **Management Actions/Direction**

- ◆ Prior to further resource management activity, including timber harvest, in Key Watersheds, prepare watershed analyses. Until watershed analyses can be completed, proceed with minor activities, such as those categorically excluded under the National Environmental Policy Act regulations (except timber harvest), if they are consistent with Aquatic Conservation Strategy objectives. Apply Riparian Reserve management actions/direction.
- ◆ Reduce existing road mileage within Key Watersheds. If funding is insufficient to implement reductions, neither construct nor authorize through discretionary permits a net increase in road mileage in Key Watersheds.
- ◆ Give highest priority to watershed restoration in Key Watersheds.
- ◆ Manage riparian-wetland areas to protect, maintain, or improve riparian-wetland habitat for wildlife and native plant diversity. Restore or maintain riparian-wetland areas so that 75 percent or more are in proper functioning condition by 1997. The overall objective is to achieve an advanced ecological status, except where resource management objectives, including proper functioning condition, will require an earlier successional stage, thus providing the widest variety of vegetation and habitat diversity for wildlife, fish, and watershed protection. Proper functioning condition exists when adequate vegetation, landform, or large woody debris are present to: dissipate stream energy associated with high water flows; filter sediment, capture bedload and aid floodplain development; improve flood water retention and groundwater recharge; develop stabilizing root masses; create aquatic habitat; and insulate streams from summer and winter temperature extremes. Proper functioning condition is discussed in Chapter 3 in the Riparian Zones section.

## **Watershed Analysis**

Watershed analysis is a set of procedures for conducting an analysis to evaluate geomorphic and ecologic processes operating in a specific watershed.

This analysis should enable watershed planning to prescribe management actions that will achieve Aquatic Conservation Strategy objectives. Watershed analysis provides the basis for monitoring and restoration programs and is the foundation from which Riparian Reserves can be delineated.

See the Watershed Analysis section (toward the end of this Chapter) and the Supplemental Environmental Impact Statement Record of Decision (Appendix D) for requirements.

### **Management Actions/Direction**

Watershed analysis is a systematic procedure to characterize watersheds. The information obtained through watershed analysis will be used to guide management prescription and monitoring programs, set and refine Riparian Reserve boundaries, and develop the watershed restoration program.

It is required in Key Watersheds prior to resource management.

It is required in all roadless areas prior to resource management.

It is *recommended* in all other watersheds.

It is required to change Riparian Reserve widths in all watersheds.

Earthflows qualify as unstable and potentially unstable areas and will be analyzed for inclusion within Riparian Reserves.

## **Watershed Restoration**

Watershed restoration will be an integral part of a program designed to aid recovery of fish habitat, riparian-wetland habitat, and water quality. The most important components of a watershed restoration program are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of instream habitat complexity. Other restoration opportunities include meadow and wetland restoration and mine reclamation.

Restoration will be based on watershed analysis and planning. Watershed analysis is essential to identify areas of greatest benefit-to-cost relationships for restoration opportunities and greatest likelihood of success. Watershed analysis can also be used as a medium to develop cooperative projects involving

## Chapter 2 - Description of the Alternatives

various landowners. In many watersheds the most critical restoration needs occur on private lands both upstream and downstream from federally managed lands. Decisions to apply a given treatment depend on the value and sensitivity of downstream uses, transportation needs, social expectations, risk assessment of probable outcomes for success at correcting problems, costs, and other factors. Watershed analysis, including the use of sediment budgets, provides a framework for considering benefit-to-cost relations in a watershed context. Thus, the magnitude of restoration needs within the planning area will be based on watershed analysis.

### Management Actions/Direction

1. Prepare watershed analyses and plans prior to restoration activities. Activities will be designed to restore watershed processes and recover degraded habitat. See Use of the Plan section.
2. Focus watershed restoration on removing some roads and, where needed, upgrading those that remain in the system.
3. Apply silvicultural treatments to restore and retain large conifers in Riparian Reserves.
4. Restore stream channel complexity. Instream structures will only be used in the short term and not as a mitigation measure.

Additional information about the Aquatic Conservation Strategy is found in Supplemental Environmental Impact Statement Record of Decision (Appendix D).

## Land Use Allocations and Resource Programs

This Land Use Allocations and Resource Programs section has three major parts:

- ♦ management actions/direction for all land use allocations and resource programs;
- ♦ specific land use allocations - objectives, allocations, and management actions/direction for each category; and
- ♦ resource programs - objectives, allocations, and management actions/direction for each category.

This section provides a description of objectives, land use allocations, and management actions/direction for this proposed resource management plan. The term "land use allocations" is used in two ways. First,

it pertains to the major land use allocation categories derived from the Supplemental Environmental Impact Statement and its Record of Decision (for example, Riparian Reserves and Late-Successional Reserves) and the still relevant allocations of the Klamath Falls Resource Area draft Resource Management Plan. The second use pertains to data and text describing specific allocations (for example, acres, miles, and number of sites) under each land use allocation and resource program category.

Although described separately, each of these elements contributes collectively and cumulatively to meeting the overall management strategy and must be considered together to accurately reflect the concept of ecosystem management. There is some duplication of objectives and management actions/direction for land use allocations and resource programs. A reader interested in either topic will find a basic package of related management guidance in one location.

Most resource programs have basic requirements for activities such as inventory, site-specific analysis, planning, and environmental assessment prior to project implementation and monitoring after project implementation. Inherent in the proposed resource management plan is a BLM commitment to continue these activities in the future. For the sake of simplifying text, these activities are generally not repeated in the management actions/direction that follow.

A summary of the land use allocations and management actions/direction for the proposed resource management plan is found in Table 2-1. Most land use allocations are shown on the Chapter 2 maps in the accompanying packet.

### Management Actions/Direction for All Land Use Allocations and Resource Programs

The Supplemental Environmental Impact Statement Record of Decision provides guidance for six topics which apply to all land use allocations. Guidance for four of these topics is found under Recreation, Fire/Fuels Management, and Grazing Management, and in the Research section (toward the end of this Chapter). Guidance for the other two topics is described below (Survey and manage, and protection buffers).

All management actions/direction in this proposed resource management plan are subject to refinement through planning based on watershed analysis and

the adaptive management process. In some areas, land use allocations overlap. A hierarchy of allocations and related management actions/direction will be used to guide plan implementation (see the Supplemental Environmental Impact Statement Record of Decision, Appendix D).

### **Survey and Manage for Amphibians, Mammals, Bryophytes, Mollusks, Vascular Plants, Fungi, Lichens, and Arthropods**

Implement the survey and manage provision of the Supplemental Environmental Impact Statement Record of Decision within the range of Supplemental Environmental Impact Statement special attention species and the particular habitats that they are known to occupy. Appendix E shows which species are covered by the provision, and which of the following four categories and management actions/direction are to be applied to each:

#### **1. Manage known sites (highest priority).**

- ◆ Acquire information on these sites, make it available to all project planners, and use it to design or modify activities.
- ◆ Protect known sites. For some species, apply specific management treatments such as prescribed fire.
- ◆ For rare and endemic fungus species, temporarily withdraw known sites from ground-disturbing activities until the sites can be thoroughly surveyed and site-specific measures prescribed.

#### **2. Survey prior to ground-disturbing activities and manage sites.**

- ◆ Continue existing efforts to survey and manage rare and sensitive species habitat.
- ◆ For species without survey protocols, start immediately to design protocols and implement surveys.
- ◆ Within the known or suspected ranges and within the habitat types of vegetation communities associated with the species, survey for:
  - ◆ Red tree voles
  - ◆ Lynx
- ◆ For the other species listed in Appendix E, begin development of survey protocols promptly and proceed with surveys as soon as possible. These surveys will be completed prior to ground-disturbing activities that will be implemented in

Fiscal Year 1999 or later. Work to establish habitat requirements and survey protocols may be prioritized relative to the estimated threats to the species as reflected in the Supplemental Environmental Impact Statement.

- ◆ Conduct surveys at a scale most appropriate to the species.
  - ◆ Develop management actions/direction to manage habitat for the species on sites where they are located.
  - ◆ Incorporate survey protocols and proposed site management in interagency conservation strategies developed as part of ongoing planning efforts coordinated by the Regional Ecosystem Office.
- #### **3. Conduct extensive surveys and manage sites**
- ◆ Conduct extensive surveys for the species to find high-priority sites for species management. Specific surveys prior to ground-disturbing activities are not a requirement.
  - ◆ Conduct surveys according to a schedule that is most efficient and identify sites for protection at that time.
  - ◆ Design these surveys for efficiency and develop standardized protocols.
  - ◆ Begin these surveys by 1996.

#### **4. Conduct general regional surveys.**

- ◆ Survey to acquire additional information and to determine necessary levels of protection for arthropods, fungi species that were not classed as rare and endemic, bryophytes, and lichens.
- ◆ Initiate these surveys no later than Fiscal Year 1996 and complete them within 10 years.

## **Protection Buffers**

Provide protection buffers for specific rare and locally endemic species and other species in the upland forest matrix. A list of these species and related management actions/direction are presented in Appendix E and the section on Special Status and Supplemental Environmental Impact Statement Special Attention Species. These species are likely to be assured viability if they occur within reserves. However, there might be occupied locations outside reserves that will be important to protect as well.

Apply the following management actions/direction:



1. Develop survey protocols that will ensure a high likelihood of locating sites occupied by these species.
2. Following development of survey protocols and prior to ground-disturbing activities, conduct surveys within the known or suspected ranges of the species and within the habitat types or vegetation communities occupied by the species. See the previous Survey and Manage section for an implementation schedule.
3. When located, protect the occupied sites.

See Special Status and Supplemental Environmental Impact Statement Special Attention Species section for additional details.

## Specific Land Use Allocations

This section describes specific land use allocations developed for the Supplemental Environmental Impact Statement Record of Decision.

Two of the allocations in the Supplemental Environmental Impact Statement Record of Decision, Congressionally Reserved Areas and Administratively Withdrawn Areas, are simply recognition of valid resource management decisions in existing or proposed plans. These allocations are fully incorporated in the resource program elements of this proposed resource management plan. They are not described as separate land use allocations in this document.

The types of administratively withdrawn areas in the resource area include campgrounds, research natural areas, areas of critical environmental concern, and Late-Successional/District Designated Reserves.

## Riparian Reserves

The following material summarizes Riparian Reserve direction. Details regarding this direction are found in the Supplemental Environmental Impact Statement Record of Decision (Appendix D).

### Objectives

See Aquatic Conservation Strategy Objectives.

Provide habitat for special status, Supplemental Environmental Impact Statement special attention species, and other terrestrial species (see the Wildlife and Special Status Species and Special Areas Habitat sections later in the Chapter)

## Land Use Allocations

There are approximately 19,450 west side and 9,100 east side acres of Riparian Reserves in the Resource Area. Calculation of these acres is based on prescribed widths and estimated miles of stream in the various categories described in the Supplemental Environmental Impact Statement Record of Decision. The widths are intended to provide a high level of fish, wildlife, and plant habitat and riparian protection until watershed and site analysis can be completed. Although Riparian Reserve boundaries on permanently flowing streams may be adjusted, they are considered to be the approximate widths necessary for attaining Aquatic Conservation Strategy objectives. Post-watershed analysis Riparian Reserve boundaries for permanently flowing streams will approximate the boundaries described below. Following watershed analysis, Riparian Reserve boundaries for intermittent streams may be different from the existing boundaries. Determination of final boundaries will be based on hydrologic, geomorphic and ecologic processes in a watershed affecting intermittent streams. The widths of Riparian Reserves apply to all watersheds until watershed analysis is completed, a site-specific analysis is conducted and described, and the rationale for final Riparian Reserve boundaries is presented through the appropriate National Environmental Policy Act decision-making process.

More information on Riparian Reserves is located in Appendix D. Best management practices for activities conducted in or near Riparian Reserves are listed in Appendix F.

The initial Riparian Reserve widths for the Klamath Falls Resource Area are as follows:

**Fish-bearing streams.** Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.

**Permanently flowing non-fish-bearing streams.** Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a

distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest.

**Seasonally flowing or intermittent streams, wetlands less than one acre, and unstable and potentially unstable areas.** This category applies to features with high variability in size and site-specific characteristics. At a minimum the Riparian Reserves will include:

- ◆ the extent of unstable and potentially unstable areas;
- ◆ the stream channel and the area extending to the top of the inner gorge;
- ◆ the stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation; and
- ◆ the area extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest.

**Constructed ponds and reservoirs, and wetlands greater than one acre.** Riparian Reserves consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or to 150 feet slope distance from the edge of a wetland greater than one acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest. (Riparian vegetation and seasonally saturated soils will generally constitute a wetland and will be managed as prescribed for wetlands.)

**Lakes and Natural Ponds.** Riparian Reserves consist of the body of water and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance, whichever is greatest. (Riparian vegetation and seasonally saturated soils will generally constitute a wetland and will be managed as prescribed for wetlands.) Riparian Reserves are illustrated in Figure 2-1.

## Management Actions/Direction

### General

As a general rule, management actions/direction for Riparian Reserves prohibit or regulate activities that retard or prevent attainment of Aquatic Conservation Strategy objectives. Watershed analysis and appropriate National Environmental Policy Act compliance will be required to change Riparian Reserves in all watersheds.

Implement the following management actions/direction in Riparian Reserves. (Management actions/direction in this section are supplemented by the best management practices in Appendix F.)

Apply the management actions/direction in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section.

### Timber Management

Neither conduct nor allow timber harvest, including fuelwood cutting, in Riparian Reserves, with exception of the following:

- ◆ Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian-wetland conditions, allow salvage and fuelwood cutting if required to attain Aquatic Conservation Strategy objectives.
- ◆ Remove salvage trees only when watershed analysis determines that present and future coarse woody debris needs are met and other Aquatic Conservation Strategy objectives are not adversely affected.
- ◆ Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

Riparian Reserve acres are not included in calculations of the probable sale quantity.

### Road Management

Cooperate with federal, state, and county agencies and work with private parties with road use agreements to achieve consistency in road design, operation, and maintenance necessary to attain Aquatic Conservation Strategy objectives.

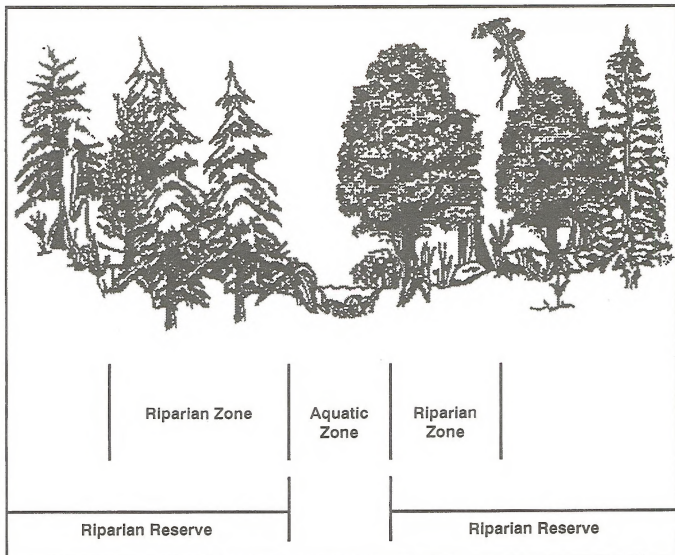


Figure 2-1. Riparian Reserves (Note: Illustration is not to scale.)

For each existing or planned road, meet Aquatic Conservation Strategy objectives by:

- ◆ completing watershed analyses including appropriate geotechnical analyses (that is, examining soil and rock conditions in riparian and stream crossings) prior to construction of new roads or landings in Riparian Reserves;
- ◆ minimizing road and landing locations in Riparian Reserves;
- ◆ preparing road design criteria, elements, and standards that govern construction and reconstruction;
- ◆ preparing operation and maintenance criteria that govern road operation, maintenance, and management;

- ◆ minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow;
- ◆ restricting sidelaying as necessary to prevent the introduction of sediment to streams; and
- ◆ avoiding wetlands entirely when constructing new roads.

Determine the influence of each road on the Aquatic Conservation Strategy objectives through watershed analysis. Meet Aquatic Conservation Strategy objectives by:

- ◆ reconstructing roads and associated drainage features that pose a substantial risk;
- ◆ prioritizing reconstruction based on current and potential impact to riparian-wetland resources

and the ecological value of the riparian-wetland resources affected; and

- ◆ closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs.

Design and construct new culverts, bridges, and other stream crossings and improve existing culverts, bridges, and other stream crossings determined to pose a substantial risk to riparian conditions. New structures and improvements will be designed to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian-wetland resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping will increase sediment delivery to streams or where outsloping is infeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.

Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy objectives. As a minimum, this plan will include provisions for the following activities:

- ◆ inspections and maintenance during storm events;
- ◆ inspections and maintenance after storm events;
- ◆ road operation and maintenance giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian-wetland resources;
- ◆ traffic regulation during wet periods to prevent damage to riparian-wetland resources; and
- ◆ establishing the purpose of each road by developing a road management objective.

### **Minerals Management**

NOTE: The following management actions/direction differ from the standards and guidelines in the Supplemental Environmental Impact Statement

Record of Decision, since the standards and guidelines are not all implementable under current laws and regulations. The stronger standards and guidelines in the Supplemental Environmental Impact Statement Record of Decision will be adopted at such time as changes in current laws and/or regulations authorize their implementation. See Appendix D.

For any proposed locatable mining operation in Riparian Reserves, other than notice level or casual use, require the following actions by the operator consistent with 43 Code of Federal Regulations 3809 regulations:

1. Prepare a Plan of Operations, including a reclamation plan and reclamation bond for all mining operations in Riparian Reserves. Such plans and bonds will address the costs of removing facilities, equipment, and materials; recontouring of disturbed areas to an approved topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvaging and replacing topsoil; and revegetating to meet Aquatic Conservation Strategy objectives.
2. Locate structures, support facilities, and roads outside Riparian Reserves. If no alternative to siting facilities in Riparian Reserves exists, locate in a way compatible with Aquatic Conservation Strategy objectives. Road construction will be kept to the minimum necessary for the approved mineral activity. Roads will be constructed and maintained to meet road management standards and to minimize damage to resources in Riparian Reserves. When a road is no longer required for mineral or land management activities, it will be reclaimed. In any case, access roads will be constructed consistent with 43 Code of Federal Regulations 3809 and acceptable road construction standards and will minimize damage to resources in Riparian Reserves.
3. Avoid locating solid and sanitary waste facilities in Riparian Reserves. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Reserves exists, if releases can be prevented, and if stability can be ensured, then:
  - ◆ Analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics.
  - ◆ Locate and design the waste facilities using best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology



## **Chapter 2 - Description of the Alternatives**

is not sufficient to prevent such releases and ensure stability over the long term, prohibit such facilities in Riparian Reserves.

- ◆ Reclaim waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
- ◆ Monitor waste and waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
- ◆ Require reclamation bonds adequate to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.

Where an existing operator is in noncompliance at the notice level (that is, causing unnecessary or undue degradation), require actions similar to those stated above to meet the intent of 43 Code of Federal Regulations 3809.

For future leasable mineral activity in Riparian Reserves, prohibit surface occupancy for oil, gas, and geothermal exploration and development activities unless it can be demonstrated that impacts will be acceptable or can be mitigated so that the objectives of the Aquatic Conservation Strategy can be met. Where possible, adjust the stipulations in existing leases to eliminate impacts that retard or prevent the attainment of Aquatic Conservation Strategy objectives, consistent with existing lease terms and stipulations.

Allow development of salable minerals, such as sand and gravel, within Riparian Reserves only if Aquatic Conservation Strategy objectives can be met.

Develop inspection and monitoring requirements and include such requirements in exploration and mining plans and in leases or permits consistent with existing laws and regulations. Evaluate the results of inspection and monitoring to determine if modification of plans, leases and permits is needed to eliminate impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

### **Recreation Management**

Design new recreational facilities within Riparian Reserves, including trails and dispersed sites, so as not to prevent meeting Aquatic Conservation Strategy objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impacts to ensure that these do

not prevent, and to the extent practicable contribute to, attainment of Aquatic Conservation Strategy objectives.

Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective, eliminate the practice or occupancy.

Address attainment of Aquatic Conservation Strategy objectives in Wild and Scenic River and Wilderness management plans.

### **Fire/Fuels Management**

Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian-wetland ground cover and vegetation. Strategies will recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management activities could be damaging to long-term ecosystem function.

Locate incident bases, camps, helibases, staging areas, helispots and other centers for incident activities outside of Riparian Reserves. If the only suitable location for such activities is within the Riparian Reserve, an exemption may be granted following a review and recommendation by a resource advisor. The advisor will prescribe the location, use conditions, and rehabilitation requirements. Use an interdisciplinary team to predetermine suitable incident base and helibase locations.

Minimize delivery of chemical retardant, foam, or other additives to surface waters. An exception may be warranted in situations where over-riding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor, when an escape would cause more long-term damage.

Design prescribed burn projects and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.

Immediately establish an emergency team to develop a rehabilitation treatment plan needed to attain Aquatic Conservation Strategy objectives whenever Riparian Reserves are significantly damaged by a wildfire or a prescribed fire burning outside prescribed parameters.

Limit the size of all wildfires.

Allow some natural fires to burn under prescribed conditions. This decision will be based on additional analysis and planning.

Rapidly extinguishing smoldering coarse woody debris and duff should be considered to preserve these ecosystem elements.

Locate and manage water drafting sites (for example, sites where water is pumped to control or suppress fires) to minimize adverse effects on riparian-wetland habitat and water quality as consistent with Aquatic Conservation Strategy objectives.

### **Lands**

Identify instream flows needed to maintain riparian-wetland resources, channel conditions, and fish passage in coordination with the Oregon Department of Fish and Wildlife, Department of Environmental Quality, and the Oregon Parks and Recreation Department.

Issue leases, permits, rights-of-way, and easements to avoid adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where legally possible, adjust existing leases, permits, rights-of-way, and easements to eliminate adverse effects that retard or prevent the attainment of Aquatic Conservation Strategy objectives. If adjustments are not effective and where legally possible, eliminate the activity. Priority for modifying existing leases, permits, rights-of-way and easements will be based on the actual or potential impact and the ecological value of the riparian-wetland resources affected.

Use land acquisition, exchange, and conservation easements to meet Aquatic Conservation Strategy objectives and facilitate restoration of fish stocks and other species at risk of extinction.

For proposed hydroelectric projects under the jurisdiction of the Federal Energy Regulatory Commission, provide timely, written comments regarding maintenance of instream flows and habitat conditions and maintenance/restoration of riparian resources and stream channel integrity. Request the Federal Energy Regulatory Commission to locate proposed support facilities outside of Riparian Reserves. For existing support facilities inside Riparian Reserves that are essential to proper management, provide recommendations to the Commission that ensure Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, provide recommendations to the Federal Energy Regulatory

Commission that such support facilities should be relocated. Existing support facilities that must be located in the Riparian Reserves should be located, operated, and maintained with an emphasis to eliminate adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives.

For other hydroelectric and surface water development proposals in Tier 1 Key Watersheds, require instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. For other hydroelectric and surface water development proposals in all other watersheds, give priority emphasis to instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies.

### **Grazing Management**

Protect the following sites from grazing: known and newly discovered sites of the following mollusk species will be protected from grazing by all practicable steps to ensure that the local populations of the species will not be impacted. These species include: *Fluminicola n. sp. 1*, *Fluminicola n. sp. 11*, *Fluminicola n. sp. 19*, *Fluminicola n. sp. 20*, *Fluminicola n. sp. 3*, and *Fluminicola seminalis*. Freshwater mollusks in the family *Hydrobiidae* (to which the genus *Fluminicola* belong) are known to exist in the resource area. Tentative identification of mollusks collected at several sites in the resource area has been made. Further investigation is required for more positive identification of which species of *Fluminicola* are present in the resource area. Implementation of protection actions will be initiated after watershed analysis and appropriate National Environmental Policy Act decisions.

Through a planning and environmental analysis process appropriate to the action, adjust or eliminate grazing practices that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Locate new livestock handling and/or management facilities outside Riparian Reserves. For existing livestock handling facilities inside Riparian Reserves, ensure that Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, require relocation or removal of such facilities.

Limit livestock trailing, bedding, watering, loading, and other handling efforts to those areas and times

## **Chapter 2 - Description of the Alternatives**

that will ensure Aquatic Conservation Strategy objectives are met.

### ***Watershed and Habitat Restoration***

Design and implement watershed restoration projects in a manner that promotes long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and attains Aquatic Conservation Strategy objectives.

Cooperate with federal, state, local, and tribal agencies, and private landowners to develop watershed-based coordinated resource management plans or other cooperative agreements to meet Aquatic Conservation Strategy objectives.

Prevent watershed and habitat degradation rather than relying on mitigation measures or planned restoration.

### ***General Riparian Area Management***

Identify and attempt to secure instream flows needed to maintain riparian resources, channel conditions, fish passage, and aquatic habitat in coordination with the Oregon Department of Fish and Wildlife, Department of Water Resources, Department of Environmental Quality, and the Oregon Parks and Recreation Department.

Fall trees in Riparian Reserves when they pose a safety risk. Keep felled trees on site when needed to meet coarse woody debris objectives.

Apply herbicides, insecticides, other toxicants, and other chemicals only in a manner that avoids impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Locate water drafting sites (sites where water is pumped to control or suppress fires or for road construction and maintenance) to minimize adverse effects on stream channel stability, sedimentation, and instream flows needed to maintain riparian resources, channel conditions, and fish habitat.

### ***Fish and Wildlife Management***

Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.

Design, construct, and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of

Aquatic Conservation Strategy objectives. For existing fish and wildlife interpretive and other user-enhancement facilities inside Riparian Reserves, ensure that Aquatic Conservation Strategy objectives are met. Where Aquatic Conservation Strategy objectives cannot be met, relocate or close such facilities.

Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of Aquatic Conservation Strategy objectives.

Cooperate with federal, tribal, and state fish management agencies to identify and eliminate impacts associated with habitat manipulation, fish stocking, harvest and poaching that threaten the continued existence and distribution of native fish stocks inhabiting streams with adjacent or nearby federal lands.

## **Late-Successional/District Designated Reserves**

The following material summarizes Late-Successional Reserves direction. Details regarding this direction are found in the Supplemental Environmental Impact Statement Record of Decision (Appendix D). In the Klamath Falls Resource Area there are only unmapped Late-Successional/District Designated Reserves, not the large mapped Late-Successional Reserves shown in the Supplemental Environmental Impact Statement.

The Klamath Falls Resource Area draft Preferred Alternative's Protected Habitat Areas have become unmapped Late-Successional/District Designated Reserves in the proposed resource management plan/environmental impact statement. The Protected Habitat Area Buffers are still a part of the Matrix, but retain the resource area's special management restrictions. The Protected Habitat Area Buffers are now called Late-Successional/District Designated Reserve buffers.

### **Objectives**

Protect and enhance conditions of late-successional and old growth forest ecosystems, which serve as habitat for late-successional and old growth forest-related species including the northern spotted owl.

Maintain a functional, interacting, late-successional, and old growth forest ecosystem.



## **Land Use Allocations**

On the west side of the Klamath Falls Resource Area there are approximately 1,600 acres allocated to Late-Successional/District Designated Reserves. This allocation is composed of blocks of land containing approximately 80 to 100 acres each.

Also, protection buffers for special status and Supplemental Environmental Impact Statement special attention species will be made as identified in the Supplemental Environmental Impact Statement Record of Decision. These protection buffers will be part of the Late-Successional/District Designated Reserves. There are also district designated buffers on special status and threatened and endangered species protecting nest sites, sensitive plant areas, etc. These protection buffers will often be part of the Late-Successional/District Designated Reserves.

## **Management Actions/Direction**

### ***General***

Apply the management actions/direction in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section.

Plan and implement non-silvicultural activities inside Late-Successional Reserves/District Designated Reserve that are neutral or beneficial to the creation and maintenance of late-successional habitat.

Using interdisciplinary teams, evaluate other activities not described below and document appropriate guidelines.

Request review by the Regional Ecosystem Office of all activities deemed to have potential adverse effects on Late-Successional/District Designated Reserve objectives. The Regional Ecosystem Office may develop additional criteria for exempting some additional activities from review.

Provide Late-Successional/District Designated Reserves for biodiversity and old growth habitat on the east side by the designation of Miller Creek Canyon and Yainax Butte as areas of critical environmental concern (see the Special Areas section). Manage forest lands on the east side of the planning area under uneven-age harvest prescriptions that will provide for a diversity of structure and species composition.

## **Silviculture**

Plan and implement silvicultural treatments inside Late-Successional/District Designated Reserves that are beneficial to the creation of late-successional habitat.

If needed to create, maintain, or enhance late-successional forest conditions, conduct thinning operations in forest stands. This will be accomplished by pre-commercial thinning, commercial thinning, or selective harvesting of stands regardless of origin (for example, planted after logging or naturally regenerated after fire or blowdown).

Given the increased risk of fire due to lower moisture conditions and the rapid accumulation of fuels in the aftermath of insect outbreaks and drought, additional management activities will be allowed in Late-Successional/District Designated Reserves. Guidelines to reduce risks of large-scale disturbance are as follows:

1. Large-scale disturbances, such as fire, are natural events and can eliminate spotted owl habitat on hundreds of thousands of acres. Certain risk management activities, if properly planned and implemented, may reduce the probability of these major stand-replacing events. Elevated risk levels are attributed to changes in the characteristics and distribution of the mixed-conifer forests resulting from past fire protection. These forests occur in drier environments, have had repeated insect infestations, and are susceptible to major fires. Risk reduction efforts are encouraged where they are consistent with the objectives for the Late-Successional/District Designated Reserves.
2. Silvicultural activities aimed at reducing risk shall focus on younger stands in Late-Successional/District Designated Reserves. The objective will be to accelerate development of late-successional conditions while making the future stand less susceptible to natural disturbances. Salvage activities should focus on the reduction of catastrophic insect, disease, and fire threats. Treatments should be designed to provide effective fuel breaks wherever possible. However, the scale of salvage treatments should not generally result in degeneration of currently suitable owl habitat or other late-successional conditions.
3. In some Late-Successional/District Designated Reserves, management that goes beyond these guidelines may be considered. Levels of risk in those Late-Successional/District Designated Reserves may be particularly high and may require additional measures. Consequently, management

## **Chapter 2 - Description of the Alternatives**

activities designed to reduce risk levels are encouraged in those Late-Successional/District Designated Reserves even if a portion of the activities must take place in currently late-successional habitat. While risk-reduction efforts should generally be focused on young stands, activities in older stands may be appropriate if: the proposed management activities will clearly result in greater assurance of long-term maintenance of habitat, the activities are clearly needed to reduce risks, and the activities will not prevent the Late-Successional/District Designated Reserve from playing an effective role in the objectives for which they were established.

Example of activities that may be needed in Late-Successional/District Designated Reserves to reduce large-scale disturbances are:

- ◆ light intensity underburning to reduce fuel loads;
- ◆ light thinning of the understory component in the stands; or
- ◆ manipulating species composition or develop a diversity of conifer species.

### **Salvage**

Limit salvage of dead trees in Late-Successional/District Designated Reserves to areas where stand-replacing events exceed ten acres in size. Treat areas where stand replacing events exceed ten acres in size to the Late-Successional/District Designated Reserve objectives.

Retain all standing live trees including those injured (for example scorched) but likely to survive.

Retain snags that are likely to persist until late-successional forest conditions have developed and a new stand is again producing large snags.

Retain adequate coarse woody debris quantities in a new stand so that in the future it will still contain amounts similar to naturally regenerated stands. Watershed-level or province-level plans will establish appropriate levels of coarse woody debris to be used. Levels will be typical and will not require retention of all material where it is highly concentrated or too small to contribute to coarse woody debris over the long term.

If essential to reduce future risk of fire or insect damage, conduct salvage that does not meet the preceding management actions/ direction. Focus on those areas where there is high risk of large scale disturbance.

Remove snags and logs to reduce hazards to humans along roads and trails and in or adjacent to recreation sites. Leave some material where coarse woody debris is inadequate.

After disturbance in younger stands, develop diameter and biomass retention direction consistent with the intention of achieving late-successional forest conditions. Where green trees, snags, and logs are present following disturbance, the green tree and snag direction will be applied first and completely satisfied where possible. The biomass left in snags can be credited toward the amount of coarse woody debris biomass needed to achieve management objectives.

Retain logs present on the forest floor before a disturbance event.

Retain coarse woody debris to approximate the species composition of the original stand to help replicate preexisting suitable habitat conditions.

Deviate from these management actions/direction only to provide reasonable access to salvage sites and feasible logging operations. Limit deviations to as small an area as possible.

### **Road Management**

Construct roads in Late-Successional/District Designated Reserves if the potential benefits of silviculture, salvage, and other activities exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they will be kept to a minimum, be routed through unsuitable habitat where possible, and be designed to minimize adverse impacts. Alternative access methods, such as aerial logging, will be considered to provide access for activities in reserves.

Remove trees along rights-of-way if they are a hazard to public safety. Consider leaving material on site if available coarse woody debris is inadequate. Consider topping of trees as an alternative to felling.

### **Fuelwood Gathering**

Permit fuelwood gathering only in existing cull decks, in areas where green trees are marked by silviculturists for thinning, in areas where blowdown is blocking roads, and in recently harvested timber sale units where down material will impede scheduled post-sale activities or pose an unacceptable risk of future large scale disturbance. In all cases these activities will comply with management actions/direction for salvage and silvicultural activities.

### **Minerals Management**

Assess the impacts of ongoing and proposed mining activities in Late-Successional/District Designated Reserves.

Include stipulations in mineral leases, mineral material disposals, and, when legally possible, require operational constraints for locatable mineral activities to minimize detrimental effects to late-successional habitat.

### **Developments**

Neither construct nor authorize new facilities that may adversely affect Late-Successional/District Designated Reserves.

Review on a case-by-case basis new development proposals that address public needs or provide significant public benefits. They may be approved when adverse effects can be minimized and mitigated. They will be planned to have the least possible adverse impacts on Late-Successional/District Designated Reserves.

Locate new developments to avoid degradation of habitat and adverse effects on identified late-successional species.

Retain and maintain existing developments, such as campgrounds, utility corridors, and electronic sites, consistent with other management actions/direction for Late-Successional/District Designated Reserves.

Remove hazard trees along utility rights-of-way and trails and in other developed areas.

### **Recreational Uses**

Use adjustment measures, such as education, use limitations, traffic control devices, or increased maintenance, when dispersed and developed recreation practices retard or prevent attainment of Late-Successional/District Designated Reserve objectives.

### **Fuels Management**

As part of watershed analysis, plan fire management for each Late-Successional/District Designated Reserve.

Emphasize maintaining late-successional habitat in wildfire suppression plans.

Use minimum impact suppression methods for fire management in accordance with guidelines for reducing risks of large-scale disturbances.

During actual fire suppression activities, consult an interdisciplinary team to assure that habitat damage is minimized.

Until a fire management plan is completed for a Late-Successional/District Designated Reserve or group of reserves, suppress wildfire to avoid loss of habitat and to maintain future management options.

Prepare a specific fire management plan prior to any habitat manipulation activities in Late-Successional/District Designated Reserves. Specify how hazard reduction and other prescribed fire applications meet the objectives of the Late-Successional/District Designated Reserve. Until the plan is approved, proposed activities will be subject to review by the Regional Ecosystem Office.

Apply prescribed fire in a manner which retains the amount of coarse woody debris determined through watershed analysis.

Limit the size of all wildfires to the extent practicable.

Allow some natural fires to burn under prescribed conditions. This decision will be based on additional analysis and planning.

Consider rapidly extinguishing smoldering coarse woody debris and duff.

### **Lands**

Consider land exchanges in Late-Successional/District Designated Reserves if they provide benefits equal to or better than current conditions.

Consider land exchanges especially to improve area, distribution, and quality (for example connectivity, shape, and contribution to biodiversity) of Late-Successional/District Designated Reserves, especially where public and private lands are intermingled.

### **Grazing Management**

In coordination with wildlife and fish biologists, implement range related management activities that do not adversely affect late-successional habitat.

Through a planning and environmental analysis process appropriate to the action, adjust or eliminate grazing practices that retard or prevent attainment of

## ***Chapter 2 - Description of the Alternatives***

Late-Successional/District Designated Reserve objectives.

Evaluate effects of existing and proposed livestock management and handling facilities in Late-Successional/District Designated Reserves to determine if reserve objectives are met. Where objectives cannot be met, relocate livestock management and/or handling facilities.

### ***Habitat Improvement Projects***

Design projects to improve conditions for fish, wildlife, and watersheds if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible.

Design projects for recovery of threatened or endangered species even if they result in some reduction of habitat quality for other late-successional species.

Design and implement watershed restoration projects consistent with Late-Successional/District Designated Reserve objectives.

### ***Special Forest/Natural Products***

Evaluate whether special forest/natural product harvest activities have adverse effects on Late-Successional/District Designated Reserve objectives.

Prior to selling special forest products, ensure resource sustainability and protection of other resource values such as special status plant or animal species.

Where special forest product activities are extensive, evaluate whether they have significant effects on late-successional habitat. Restrictions may be appropriate in some cases.

### ***Rights-of-Way, Contracted Rights, Easements, and Special/Temporary Use Permits***

Access to nonfederal lands through Late-Successional/District Designated Reserves will be considered and existing right-of-way agreements, contracted rights, easements, and special/temporary use permits in Late-Successional/District Designated Reserves will be recognized as valid uses.

For all new rights-of-way proposals, design mitigation measures to reduce adverse effects on Late-Successional/District Designated Reserves. Consider alternative routes that avoid Late-Successional/District Designated Reserves. If rights-of-way must

be routed through a reserve, design and locate them to have the least impact on late-successional habitat.

Review all special/temporary use permits. When objectives of Late-Successional/District Designated Reserves are not being met, reduce impacts through education or modification of existing permits.

### ***Non-native Species***

If introduction of a non-native species is proposed, complete an assessment of impacts and avoid any introduction that will retard or prevent achievement of Late-Successional/District Designated Reserve objectives.

Evaluate impacts of non-native species (plant and animal) existing within reserves.

Develop plans and recommendations for eliminating or controlling non-native species which are inconsistent with Late-Successional/District Designated Reserve objectives. Include an analysis of effects of implementing such programs on other species or habitats within Late-Successional/District Designated Reserves.

### ***Protection Buffers***

See the Special Status and Supplemental Environmental Impact Statement Special Attention Species section.

## ***Matrix (General Forest Management Area) - West Side***

The Matrix, or General Forest Management Area, on the west side, totals approximately 23,550 acres. Included in the Matrix are approximately 2,300 acres of buffers around the District Designated Reserves (Late-Successional/District Designated Reserve buffers). Management direction for the Late-Successional/District Designated Reserve buffer lands is more restrictive than for the other matrix lands, and is described separately. The Matrix in the Klamath Falls Resource Area is designed to provide connectivity and biological diversity across the landscape rather than in large connectivity/diversity blocks.

### ***Objectives***

Produce a sustainable supply of timber and other forest commodities.



Provide connectivity (along with other allocations such as Riparian Reserves) across the landscape for forest dependent plant and animal species.

Provide habitat for a variety of organisms associated with both late-successional and younger forests.

Provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees.

Provide early-successional habitat.

## **Land Use Allocation**

There are approximately 23,550 acres of BLM-administered land in the Matrix (General Forest Management Area) on the west side.

## **Management Actions/Direction**

Apply the management actions/direction in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section. Conduct timber harvest and other silvicultural activities in that portion of the Matrix with suitable forest lands, according to management actions/ direction summarized below, the Timber section, and Appendix G.

A portion of BLM-administered forest lands will be available for maintenance of biological diversity, including old growth characteristics, and will not be subject to planned timber harvest. These forest lands include: nonsuitable woodlands, suitable woodlands-all categories, recreation sites, forest lands allocated for riparian-wetland area protection in Riparian Reserves, proposed areas of critical environmental concern and research natural areas, core areas around bald eagle and spotted owl nest sites, and other areas required for threatened and endangered species recovery. These forest lands total approximately 24,050 acres, of which 6,600 acres are currently old growth and 6,100 acres are mature forest.

Designate the Klamath Canyon an Area of Critical Environmental Concern (see the Special Areas section) and manage for old growth and diversity of native plant communities, as well as for historic, cultural, scenic, fisheries, and wildlife populations.

Manage the 23,550 acres of Matrix forest lands under uneven-age/multiple canopy management harvest prescriptions (see the Timber section). These forest lands will allow for migration and dispersal of organisms between the Late-Successional Reserves on

U.S. Forest Service land to the north and the Klamath Canyon to the south (see Maps 2-1 and 2-2 in the map packet).

Provide a renewable supply of large down logs well distributed across the Matrix landscape in a manner that meets the needs of species and provides for ecological functions. Down logs will reflect the species mix of the original stand.

- ◆ Leave 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long. Decay class 1 and 2 logs will be credited toward the total. Down logs will reflect the species mix of the original stand. Where this management actions/direction cannot be met with existing coarse wood debris, merchantable material will be used to make up the deficit.
- ◆ In areas of partial harvest, apply the same basic management actions/decision, but they can be modified to reflect the timing of stand development cycles where partial harvest is practiced.
- ◆ Retain coarse woody debris already on the ground, and protect it to the extent compatible with ecosystem processes of the site, from disturbance during treatment (for example, underburning and yarding) that might otherwise destroy the integrity of the substrate.
- ◆ Retain 16 to 25 large green trees per acre where available.
- ◆ Retain snags within a timber harvest unit at levels sufficient to support species of cavity-nesting birds at 60 percent of potential population levels. Meet the 60 percent minimum throughout the Matrix with per acre requirements met on average areas no larger than 40 acres.
- ◆ When an area is regeneration harvested, limit patch size to 3 acres.

Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbance. Plan and implement treatments to:

- ◆ Minimize intensive burning, unless appropriate for certain specific habitats, communities, or stand conditions. Prescribed fires should be planned to leave the appropriate amount of litter and coarse woody debris for the site.
- ◆ Minimize soil and litter disturbance that may occur as a result of yarding and operation of heavy equipment.

## **Chapter 2 - Description of the Alternatives**

- ◆ Reduce the intensity and frequency of site treatments.

Retain late-successional forest patches in landscape areas where little late-successional forest persists. This management action/direction will be applied in fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest. (The assessment of 15 percent will include all federal land allocations in a watershed.) Within such an area, protect all remaining late-successional forest stands. Protection of these stands could be modified in the future when other portions of a watershed have recovered to the point where they could replace the ecological roles of these stands.

Retain 100 acres of the best northern spotted owl habitat as close as possible to a nest site or owl activity center for all known (as of January 1, 1994) spotted owl activity centers.

Additional information about Matrix management is found in the Supplemental Environmental Impact Statement Record of Decision (Appendix D).

### **Matrix (Late-Successional/District Designated Reserve Buffers)**

The following descriptions summarize direction for those areas in the west side Matrix that surround the Late-Successional/District Designated Reserves. Most of these special restriction areas are in existing old growth stands. These areas correspond with the draft Resource Management Plan/Environmental Impact Statement Preferred Alternative's Protected Habitat Area buffers.

#### **Objectives**

Protect and enhance conditions of late-successional and old growth forest stands, which serve as habitat for late-successional and old growth forest-related species including the northern spotted owl.

Maintain a functional, interacting, late-successional and old growth habitat.

Contribute substantially to the achievement of Supplemental Environmental Impact Statement Record of Decision objectives, including provision of well-distributed late-successional habitat outside reserves; retention of key structural elements of late-successional forests on lands subjected to regeneration

harvest; restoration and protection of riparian-wetland areas; and provision of a stable timber supply.

### **Land Use Allocations**

There are approximately 3,800 acres (gross) of BLM-administered land in 19 restrictive buffer areas around the Late-successional/District Designated Reserves. These areas vary in size and are distributed throughout the Matrix.

### **Management Actions/Direction**

Note: The draft Preferred Alternative's Protected Habitat Area Buffers have been renamed Late-Successional/District Designated Reserve buffers. These areas are a part of the Matrix, but will have many of the management actions/directions of the Late-Successional/District Designated Reserves applied to them. Adaptive management is a key component of the management for these areas.

#### **General**

Apply the management actions/direction in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section.

Management in the buffers around the reserves will be designed to reduce the risk of natural disturbances. Old growth ecosystem prescriptions are harvest methods designed to facilitate the attainment or maintenance of old growth characteristics (see Appendix G).

Manage coarse woody debris, green trees, and snags in a manner that meets the intent of the management actions/direction for the Matrix.

Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbances.

- ◆ Minimize intensive burning, unless appropriate for certain specific habitats, communities, or stand conditions. Prescribed fires should be planned to leave the appropriate amount of litter and coarse woody debris for the site.
- ◆ Minimize soil and litter disturbance that may occur as a result of yarding and operation of heavy equipment.
- ◆ Reduce the intensity and frequency of site treatments.

Explore and support opportunities to research the role and effects of fire/fuels management on ecosystem functions.

Plan and implement non-silvicultural activities inside these areas that are neutral or beneficial to the creation and maintenance of late-successional habitat.

Using interdisciplinary teams, evaluate other activities not described below and document appropriate guidelines.

### **Silviculture**

Produce a sustainable supply of timber and other forest commodities.

Plan and implement silvicultural treatments inside these areas that are beneficial to the creation or maintenance of late-successional habitat.

Create and maintain late-successional forest conditions. Conduct thinning operations in forest stands. This will be accomplished by pre-commercial, commercial thinning, or selective harvesting of stands regardless of origin (for example, planted after logging or naturally regenerated after fire or blowdown).

Large-scale disturbances, such as fire, are natural events and can eliminate spotted owl habitat on hundreds or thousands of acres. Certain risk management activities, if properly planned and implemented, may reduce the probability of these major stand-replacing events. Elevated risk levels are attributed to changes in the characteristics and distribution of the mixed-conifer forests resulting from past fire protection. These forests occur in drier environments, have had repeated insect infestations, and are susceptible to major fires. Risk reduction efforts are encouraged where they are consistent with the objectives for these areas.

Silvicultural activities aimed at reducing risk shall focus on younger stands. The objective will be to accelerate development of late-successional conditions while making the future stand less susceptible to natural disturbances. Salvage activities should focus on the reduction of catastrophic insect, disease, and fire threats. Treatments should be designed to provide effective fuel breaks wherever possible. However, the scale of salvage and other treatments should not generally result in degeneration of currently suitable owl habitat or other late-successional conditions.

In some of these areas, management that goes beyond these guidelines may be considered. Levels of risk in those areas may be particularly high and may require additional measures. Consequently, management activities designed to reduce risk levels are encouraged in those areas even if a portion of the activities must take place in current late-successional habitat. While risk-reduction efforts should generally be focused on young stands, activities in older stands may be appropriate if: the proposed management activities will clearly result in greater assurance of long-term maintenance of habitat; the activities are clearly needed to reduce risks; and the activities will not prevent these areas from playing an effective role in the objectives for which they were established.

Example of activities that may be needed in these areas to reduce large-scale disturbances are:

- ◆ Light to moderate intensity underburning to reduce fuel loads;
- ◆ Light to moderate thinning of the understory component in the stands; and
- ◆ Manipulating species compositions to maintain or develop a diversity of conifer species.

### **Salvage**

Down woody debris objectives would be the same as the rest of the Matrix.

Retain snags that are likely to persist until late-successional forest conditions have developed and a new stand is again producing large snags.

Retain adequate coarse woody debris quantities in a new stand so that in the future it will still contain amounts similar to naturally regenerated stands. Watershed-level or province-level plans will establish appropriate levels of coarse woody debris to be used. Levels will be typical and will not require retention of all material where it is highly concentrated or too small to contribute to coarse woody debris over the long term.

If essential to reduce future risk of fire or insect damage, conduct salvage that does not meet the preceding management actions/ direction. Focus on those areas where there is high risk of large scale disturbance.

Remove snags and logs to reduce hazards to humans along roads and trails and in or adjacent to recreation sites. Leave some material where coarse woody debris is inadequate.



## **Chapter 2 - Description of the Alternatives**

After disturbance in younger stands, develop diameter and biomass retention direction consistent with the intention of achieving late-successional forest conditions. Where green trees, snags, and logs are present following disturbance, the green tree and snag direction will be applied first and completely satisfied where possible. The biomass left in snags can be credited toward the amount of coarse woody debris biomass needed to achieve management objectives.

Retain logs present on the forest floor before a disturbance event.

Retain coarse woody debris to approximate the species composition of the original stand to help replicate preexisting suitable habitat conditions.

Deviate from these management actions/direction only to provide reasonable access to salvage sites and feasible logging operations. Limit deviations to as small an area as possible.

### **Road Management**

Construct roads in these areas if the potential benefits of silviculture, salvage, and other activities exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they will be kept to a minimum, be routed through unsuitable habitat where possible, and be designed to minimize adverse impacts. Alternative access methods, such as aerial logging, will be considered to provide access for activities in reserves.

Remove trees along rights-of-way if they are a hazard to public safety. Consider leaving material on site if available coarse woody debris is inadequate. Consider topping of trees as an alternative to felling.

### **Fuelwood Gathering**

Permit fuelwood gathering only in existing cull decks, in areas where green trees are marked by silviculturists for thinning, in areas where blowdown is blocking roads, and in recently harvested timber sale units where down material will impede scheduled post-sale activities or pose an unacceptable risk of future large scale disturbance. In all cases these activities will comply with management actions/direction for salvage and silvicultural activities.

### **Minerals Management**

Assess the impacts of ongoing and proposed mining activities in these areas.

Include stipulations in mineral leases, mineral material disposals, and, when legally possible, require operational constraints for locatable mineral activities to minimize detrimental effects to late-successional habitat.

### **Developments**

Neither construct nor authorize new facilities that may adversely affect these areas.

Review on a case-by-case basis new development proposals that address public needs or provide significant public benefits. They may be approved when adverse effects can be minimized and mitigated. They will be planned to have the least possible adverse impacts on these areas.

Locate new developments to avoid degradation of habitat and adverse effects on identified late-successional species.

Retain and maintain existing developments, such as campgrounds, utility corridors, and electronic sites, consistent with other management actions/ direction for these areas.

Remove hazard trees along utility rights-of-way and trails and in other developed areas.

## **Matrix (General Forest Management Area) - East Side**

Note: In order to not preclude options on east side forest Matrix lands during the development of the Eastside Ecosystem Management Projects Environmental Impact Statement, the following Objectives and Management Actions/Direction will apply to east side forest Matrix lands. They will be in effect until and unless otherwise amended by the record of decision on the pending Eastside Ecosystem Management Project Environmental Impact Statement.

### **Objectives**

Produce a sustainable supply of timber and other forest commodities.

Provide connectivity between biological communities.

Provide habitat for a variety of organisms associated with both late-successional and younger forests.

Provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees.

### **Land Use Allocation**

In the Matrix on the east side, there are approximately 8,750 acres of BLM-administered land in the General Forest Management Area.

### **Management Actions/Direction**

Apply the management actions/direction in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section.

Conduct timber harvest and other silvicultural activities in that portion of the Matrix with suitable forest lands, according to management actions/direction summarized below and in the Timber section.

Provide a renewable supply of large down logs well distributed across the Matrix landscape in a manner that meets the needs of species and provides for ecological functions. Down logs will reflect the species mix of the original stand and at the historical levels that existed prior to attempted fire exclusion.

- ◆ Leave 50 linear feet of logs per acre greater than or equal to 12 inches in diameter and 8 feet long. Decay class 1 and 2 logs will be credited toward the total. Down logs will reflect the species mix of the original stand. Where this management actions/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit.
- ◆ Retain historic levels (prior to fire exclusion) of coarse woody debris already on the ground and protect it to the extent compatible with ecosystem processes of the site, from disturbance during treatment (for example, underburning and yarding) that might otherwise destroy the integrity of the substrate.
- ◆ Retain 5 to 10 of the largest (greater than 16 inches diameter at breast height) and healthiest green trees per acre. In addition, maintain a sustainable uneven-aged understory so that there is a variety of different sized trees and species represented throughout the stand available for recruitment.

- ◆ On lands available for timber harvest, retain snags, live green cull trees, and green merchantable trees to provide nest sites for a minimum of 60 percent of optimal cavity nester populations, both for present needs and long-term sustainability. This retention level corresponds to approximately 1.9 snags per acre (or 190 snags per 100 acres) on west side and 1.4 snags per acre (or 140 snags per 100 acres) in forested habitat on the east side.
- ◆ Meet the 60 percent minimum throughout the Matrix with the requirements met on the average for areas no larger than 40 acres.
- ◆ When an area is regeneration harvested, limit patch size to 3 acres and retain 5 to 10 green trees per acre in the patch.

Modify site treatment practices, particularly the use of pesticides, and modify harvest methods to minimize soil and litter disturbance. Plan and implement treatments to:

- ◆ Minimize intensive burning, unless appropriate for certain specific habitats, communities, or stand conditions. Prescribed fires should be planned to leave the appropriate amount of litter and coarse woody debris for the site.
- ◆ Minimize soil and litter disturbance that may occur as a result of yarding and operation of heavy equipment.
- ◆ Reduce the intensity and frequency of site treatments to the extent compatible with ecosystem management.
- ◆ Manage range and riparian-wetland areas in the Gerber Block for a mosaic of native plant communities. This mosaic will allow for migration and dispersal of organisms between BLM-administered lands and adjacent U.S. Forest Service lands. Reintroduce fire as a natural disturbance factor through prescribed burning.

## **Resource Programs**

The following section includes objectives, land use allocations, and management actions/direction for the resource uses and programs which BLM manages in the Resource Area. Some of the management actions/direction in the previous Land Use Allocation section are repeated in this section. The intent of this duplication is to give a reader a complete package of related management guidance in one location.

## **Air Quality**

### **Objectives**

Continue efforts to meet National Ambient Air Quality Standards, Prevention of Significant Deterioration goals, and the visibility protection plan.

Maintain and enhance air quality and visibility in a manner consistent with the Clean Air Act and the State Implementation Plan.

Reduce the potential for wildfire emissions through the use of prescribed fire and other fuels management techniques.

### **Land Use Allocations**

None.

### **Management Actions/Direction**

By the year 2000, reduce particulate matter emissions and impacts from prescribed burning by 50 percent from the baseline period (1976-1979). This will be accomplished by planning, conducting, monitoring, and, if necessary, adjusting prescribed fire activities in accordance with the Oregon State Implementation Plan and the Oregon Smoke Management Plan (see Fire section).

Reduce broadcast burning in favor of lower intensity underburning. Use emission reduction mitigation measures and smoke dispersal techniques to the greatest extent practical. Wildfire hazard reduction, site preparation, and the use of prescribed fire for species habitat mitigation will be implemented in a manner consistent with ecosystem management.

Where needed, use dust abatement measures on roads during BLM timber harvest operations or other BLM commodity hauling activity. Encourage dust abatement measures when haulers use BLM roads under permits and right-of-way agreements.

Determine the cumulative effects of proposed forest management activities on local and subregional air quality and minimize impacts. Coordinate cumulative impact analysis with other federal agencies.

As part of implementation planning, prepare conformity determinations required by the Clean Air Act.

Perform an emissions tradeoff analysis to determine and quantify the effects of prescribed burning and other types of fuel management on reduction of wildfire

emissions. This analysis will be performed at the same geographic scale as conformity determinations.

Promote burning of dry fuelwood by making available copies of the Oregon Department of Environmental Quality publications to fuelwood purchasers.

For those designated nonattainment areas that smoke from woodstove is shown to be a major source of particulate matter, which directly affects both health and visibility, and most of the wood burned comes from surrounding forest land mitigation should be developed that assures proper curing of the wood has occurred before sale off of federal land. Potential consideration to meet this objectives are:

1. Coordinate the issuance of educational information, with wood permits, that targets proper gather practices and way to minimize adverse effects on air quality from inefficient burning of the wood;
2. Cooperate with local air quality control agencies and other federal land management agencies to assure uniform and accurate dissemination of public information and educational material on proper firewood use and enforcement of permit requirements across agency boundaries.

See Special Forest Products Section for additional information on firewood availability.

## **Water and Soils**

### **Objectives**

See Aquatic Conservation Strategy, Riparian Reserve and Key Watershed objectives, and management action/direction for Riparian Reserves.

As directed by the Clean Water Act, comply with state water quality requirements to restore and maintain water quality to protect the recognized beneficial uses for the Klamath Basin. See Chapter 3 for a list of these beneficial uses.

Improve and/or maintain soil productivity.

### **Land Use Allocations**

None specifically for water quality or soils. However, Riparian Reserves, Key Watershed provisions, and timber production capability classifications will assist in meeting water quality and soils management objectives.

## **Management Actions/Direction**

### **General**

Improve and/or maintain soil and water conditions by closing selected areas to off-highway vehicle use and/or limiting such use to existing or designated roads and trails. See the Recreation Section, Off-Highway Vehicles, for additional details.

### **Water**

See management actions/direction for Riparian Reserves and Key Watersheds (located in the Aquatic Conservation Strategy section).

Comply with state water quality requirements to restore and maintain water quality necessary to protect identifiable beneficial uses as directed by the Clean Water Act, as amended.

Comply with state laws and regulations pertaining to the beneficial uses (see Glossary) identified by the states and any applicable water quality standards that have been established, as directed by the Federal Water Quality Act of 1987. The State of Oregon has established a list of beneficial uses for the Klamath Basin (Oregon Administrative Rules 340-41-962) and water quality standards that provide protection for those uses. Continue to implement a nonpoint source management program in cooperation with the U.S. Environmental Protection Agency and the Oregon Department of Environmental Quality to assure protection of water and water-dependent resources.

Design management practices to comply with Oregon's Antidegradation Policy, which describes the conditions under which water quality may be lowered and when it must be maintained or enhanced. The purposes of the Antidegradation Policy, which includes policies on high quality waters, water quality limited waters (see Water Resources section in Chapter 3), and outstanding resources waters, is to protect, maintain, and enhance existing surface water quality to protect all existing beneficial uses.

Continue coordination with the Oregon Department of Environmental Quality for implementation of best management practices which protect beneficial uses of water. Best management practices will be selected based on site-specific conditions, feasibility, and the water quality standards for potentially affected waters (see Appendix F). Mining, timber, grazing, recreation, off-highway vehicle use, and other activities will be regulated to protect water quality and riparian-wetland areas.

Ensure consistency of management activities with Oregon's Statewide Water Quality Management Plan for forest practices and with Oregon's water quality criteria and guidelines (Oregon Administrative Rule 340-41).

Watershed analysis will provide the mechanism for consideration, incorporation and implementation of the above into land and water resource management planning.

Do not permit degradation of water quality if it will interfere with or become injurious to the established beneficial uses of water within those segments of a river designated under the National Wild and Scenic Rivers Act.

Protect flood plains and wetlands in accordance with Executive Orders 11988 and 11990.

The components of the Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. Please refer to these sections earlier in this Chapter for more information. These sections are supplemented by best management practices in Appendix F.

Land and water resource management will follow a four tier approach: regional, physiographic or river basin, watershed, and site specific or project level. Under this approach, analysis starts at the watershed level. The planning units will be physiographic province or river basin, consisting of a number of watersheds. Watershed based planning will be implemented and, over time, the BLM will switch from existing planning units to the provinces or modify the boundaries of current planning units to be more compatible with the watershed based approach.

Watershed analysis will provide the basis for cumulative effects analysis.

Evaluate proposed projects or management actions for their cumulative effects on water quality, runoff, and stream channel conditions. The results from the cumulative effects analysis will influence final decisions both on activity scheduling and on the application of design features and mitigation measures, including best management practices.

Please refer to the Riparian Reserves section earlier in this Chapter for additional guidance. In general, guidance for Riparian Reserves supersedes guidance



## *Chapter 2 - Description of the Alternatives*

for riparian-wetland areas in this section and in best management practices Appendix F. In some instances, however, guidance in this section and in Appendix F is more restrictive than that stipulated in the Record of Decision for Riparian Reserves. In those instances, the more restrictive guidance will be followed.

In accordance with the Riparian-Wetland Initiative for the 1990's (BLM 1991c), emphasize the following in management of riparian-wetland areas: protection of riparian-wetland areas and associated uplands; rehabilitation and maintenance of riparian-wetland areas; and partnership and cooperative rehabilitation and management of riparian-wetland areas.

Manage riparian-wetland areas to protect, maintain, or improve riparian habitat for wildlife and native plant diversity. Restore or maintain riparian-wetland areas so that 75 percent or more are in proper functioning condition by 1997. The overall objective is to achieve an advanced ecological status, except where resource management objectives, including proper functioning condition, will require an earlier successional stage, thus providing the widest variety of vegetation and habitat diversity for wildlife, fish, and watershed protection. Proper functioning condition exists when adequate vegetation, landform, or large woody debris are present to: dissipate stream energy associated with high water flows; filter sediment, capture bedload and aid floodplain development; improve flood water retention and groundwater recharge; develop stabilizing root masses; create aquatic habitat; and insulate streams from summer and winter temperature extremes. Proper functioning condition is discussed in Chapter 3 in the Riparian Zones section.

Achieve riparian-wetland area improvement and maintenance objectives through the management of existing uses, wherever feasible.

Ensure that new resource management plans and activity plans, and revisions of existing plans incorporate, as applicable, practices that enhance or maintain properly functioning riparian systems and maintain, restore or enhance water quality, and result in water quality that meets or exceeds State water quality standards.

Prescribe management of riparian-wetland values based on site-specific characteristics and settings.

Give special attention to monitoring and evaluating management activities in riparian-wetland areas and

revise management practices where site-specific objectives are not being met.

Cooperate with and encourage the involvement of interested federal, State and local governments, organizations and private parties to share information, implement management, coordinate activities, and provide education on the value, productivity and management of riparian-wetland areas.

Retain riparian-wetland areas in public ownership unless disposal would be in the public interest, as determined by land use planning.

Identify, encourage, and support research and studies needed to ensure that riparian-wetland area management objectives can be properly defined and met.

Provide environmental education materials to schools and other publics relating to riparian-wetland management.

Additionally, any requirements, goals, and objectives devised as a result of the Eastside Ecosystem Management Project and Rangeland Reform '94 will be incorporated into the resources area's grazing management program as appropriate.

Achieve watershed and riparian-wetland management objectives through improved livestock distribution and management through fencing, brush control, spring and other water source development, and through changes in livestock numbers and/or season of use. Maintain existing exclosures where appropriate to meet identified resource management objectives.

Continue implementation of the Gerber Riparian Demonstration Area Plan. Develop an interpretive program to showcase the intensive multiple use management systems currently being used to bring about improvements in riparian-wetland conditions.

### **Soils**

The Federal Land Policy and Management Act (1976) defines BLM's multiple use management mission to include protection of watersheds. In the Proposed Resource Management Plan, the overall goal will be to minimize soil erosion and rehabilitate eroded areas to maintain and enhance watershed condition and soil productivity and reduce nonpoint source pollution that could result from management and land use activities.

Watershed analysis will locate and analyze areas prone to erosion. Management opportunities identified for these areas will be evaluated to determine potential impacts. Best management practices or

mitigating measures will be identified and incorporated into future proposed activities (see Appendix F for more information). Proposed activities will also be evaluated under the National Environmental Policy Act, as appropriate, for their effects on soils.

Corrective measures will include construction of erosion control structures, allocation of proper levels of vegetation use by livestock and wildlife, forest or other land treatments measures and control or mitigation of activities that may contribute to soil erosion and degradation of watershed condition.

Rehabilitate headcuts and gullies on watershed uplands where feasible.

Rehabilitate burned areas with critical or severe erosion hazards or other environmental concerns.

Implement treatment projects, such as juniper thinning or brush control, to improve perennial grass cover conditions or wildlife habitat.

Apply best management practices during all ground- and vegetation-disturbing activities. See Appendix F for a list of practices.

Minimize disturbance of identified fragile sites. Appendix F contains management guidance for fragile sites.

Exclude fragile nonsuitable sites from the timber production base to minimize soil erosion and the effects of land management activities on surface waters.

Grazing-related plans and activities will incorporate, as applicable, grazing practices that maintain or achieve healthy, properly functioning uplands. Uplands function properly when vegetation and ground cover maintain soil conditions that can sustain natural biotic communities. The functioning condition of uplands results from the interaction of geology, soil, climate, water, biological activity, and landform.

Uplands will be managed to provide the following functions within site capabilities, consistent with Appendix F and consistent with other management direction:

- ◆ The vegetation canopy allows moisture from typical storm events to reach the soil surface.
- ◆ Standing vegetation captures blowing or drifting snow.
- ◆ Organic material (plant litter, standing vegetation) protects the soil surface from raindrop impact.

- ◆ Coarse rock fragments protect the soil surface from raindrop impact.
- ◆ Water is not restricted from infiltrating the soil surface (for example, organic matter is present and no physical soil crusting, capping, or sealing of the surface is present).
- ◆ Subsurface soil conditions support infiltration rates (for example, compaction layers and evident of frost heave are uncommon).
- ◆ Standing vegetation and plant litter detain overland flow and trap sediment.
- ◆ Surface roughness detains overland flow.
- ◆ Evidence of excessive overland flow (rills and gullies, pedestalling), wind erosion or other soil movement is uncommon.
- ◆ Plant cover and litter protect the soil surface from the evaporative effects of sun and wind.
- ◆ Plants are vigorous and productive and consist of desirable species.

## **Wildlife Habitat**

### **Objectives**

See Late-Successional/District Designated Reserves, Riparian Reserve, and Matrix objectives.

Enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations.

### **Land Use Allocations**

The land use allocations in this proposed resource management plan are designed to benefit wildlife species, in the aggregate, that use the various seral stages and other habitat areas of the forest, range, or aquatic ecosystems.

### **Management Actions/Direction**

#### **General**

Except where public safety is a concern, snags will be retained on lands not allocated to timber production at 100 percent of optimum population potential for cavity nesters. Where relevant to meeting cavity nester objectives, some green trees will be girdled or topped (having the top cut or blasted) or managed to create snags. Timber sale contracts will encourage retention of all snags and non-merchantable trees that



## Chapter 2 - Description of the Alternatives

could be left safely in timber harvest areas. For the retention of wildlife trees the following guidelines will be used:

- ◆ Leave all soft snags except where unacceptable for safety, logging system, or burning considerations.
- ◆ Leave scattered hard snags and green trees, both to provide the current needs of hard-snag dependent species and to serve as a source of future soft snags. Where available, green trees retained will be cull trees (see Glossary). If cull trees are not available, sound trees will be retained for this purpose. At least half of reserved wildlife trees will be future snags (green culls, or sound trees).

### All Land Use Allocations

Use the watershed analysis process to address wildlife habitat issues for individual watersheds. The analysis will help to resolve any concerns identified in applying management actions/direction in this section and those in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section. Other wildlife enhancement opportunities may be or have been identified through an interagency or cooperative effects (such as Coordinated Resource Management Plan, Challenge Cost Share, or existing Habitat Management Plans).

Types of enhancement opportunities are shown in Table 2-2.

Coordinate with the Oregon Department of Fish and Wildlife during planning and implementation of wildlife habitat enhancement projects.

Cooperate with federal, tribal and state wildlife management agencies to identify and mitigate impacts associated with habitat manipulation, poaching, and other management activities that threaten the continued existence and distribution of native wildlife inhabiting federal lands.

Cooperation will occur with the Oregon Department of Fish and Wildlife on any wildlife research, inventory, or monitoring conducted on Klamath Falls Resource Area-administered lands, as well as for their assistance in developing an educational program to increase public awareness of wildlife (for example Watchable Wildlife and Fish and Wildlife 2000).

Ongoing animal damage control activities conducted by the Animal and Plant Health Inspection Service/ Animal Damage Control will continue according to the annual work plan. This includes control for predation on wildlife, livestock, crops, timber, and conifer seedlings. This may also involve control of wildlife causing damage to facilities or special habitats.

In accordance with other management activities, road system management will have a goal of reducing open road density to 1.5 miles or less per section. Existing off-highway vehicle closures in big game winter ranges will remain in effect throughout the plan

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**Table 2-2. Habitat Enhancement Opportunities**

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<u>Habitat Type</u>	<u>Enhancement Opportunities</u>
Scrub/Scabrock	Big game winter range improvement <ul style="list-style-type: none"><li>- burning</li><li>- brush field rejuvenation</li></ul>
Big Game Winter Range	Seasonal closures
Juniper Woodlands	Thinning to: <ul style="list-style-type: none"><li>- release browse species</li><li>- create openings</li><li>- reduce stress on conifers.</li></ul>
All	provide additional water sources
Forests	Snag creation (where needed)
Riparian	Stream or habitat improvements

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This list is not all inclusive but gives ideas of general types of projects.

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(see the Recreation section for more details). Other important and sensitive wildlife habitats (special habitat features, project areas) will be evaluated for seasonal road closures. Some roads could remain open for administrative use, forest product removal, or access for mineral exploration and development. Road closures could be achieved using a variety of methods, such as gates, cables, boulders, obliteration or other.

### ***Riparian Reserves***

Design and implement wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.

Design, construct and operate wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of Aquatic Conservation Strategy objectives. For existing wildlife interpretive and other user-enhancement facilities inside Riparian Reserves, ensure that Aquatic Conservation Strategy objectives are met. Where Aquatic Conservation Strategy objectives cannot be met, relocate or close such facilities.

Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of Aquatic Conservation Strategy objectives.

### ***Late-Successional/District Designated Reserves***

Design projects to improve conditions for wildlife if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible.

If introduction of a non-native species is proposed, complete an assessment of impacts and avoid any introduction that will retard or prevent achievement of Late-Successional/District Designated Reserve objectives.

Evaluate impacts of non-native species existing within Late-Successional/District Designated Reserves.

Develop plans and recommendations for eliminating or controlling non-native species which are inconsistent with Late-Successional Reserve objectives. Include an analysis of effects of implementing such programs on other species within Late-Successional Reserves.

Manage the system of 80- to 100-acre Late-Successional/District Designated Reserves to provide a diverse mosaic of habitats across the west side of the planning area. These areas will not be subject to planned timber harvest but harvest will be allowed to attain or maintain old growth characteristics. These forest lands total 1,600 acres, most of which are currently old growth or mature forest.

Fire will be reintroduced as a natural disturbance factor through prescribed burning.

Provide Late-Successional/District Designated Reserves for biodiversity and old growth habitat on the east side by the designation of Miller Creek Canyon and Yainax Butte as areas of critical environmental concern (see the Special Areas section). Manage forest lands on the east side of the planning area under uneven-age harvest prescriptions that will provide for a diversity of structure and species composition.

### ***Matrix (General Forest Management Area) - West Side***

Use old growth ecosystem prescriptions in one-quarter mile buffers around each Late-Successional/District Designated Reserve. These buffer areas will provide an additional component of habitat diversity. The gross BLM-administered acreage in these areas is 3,800 acres. Old growth ecosystem prescriptions are harvest methods designed to facilitate the attainment or maintenance of old growth characteristics (see Appendix G).

On the west side, retain late-successional forest patches in landscape areas where little late-successional forest persists. This management action/direction will be applied in fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest. (The assessment of 15 percent will include all federal land allocations in a watershed.) Within such an area, protect all remaining late-successional forest stands. Protection of these stands could be modified in the future when other portions of a watershed have recovered to the point where they could replace the ecological roles of these stands.

Retain 16 to 25 large green trees per acre in harvest units.

Leave 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long. Existing decay class 1 and 2 logs count toward this

## **Chapter 2 - Description of the Alternatives**

requirement. Down logs will reflect the species mix of original stands. Where this management action/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit.

When an area is regeneration harvested, limit patch size to 3 acres.

On lands available for timber harvest, retain snags, live green cull trees, and green merchantable trees to provide nest sites for a minimum of 60 percent of optimal cavity nester populations, both for present needs and long-term sustainability. This retention level corresponds to approximately 1.9 snags per acre (or 190 snags per 100 acres).

### **Matrix (General Forest Management Area) - East Side**

On lands available for timber harvest, retain snags, live green cull trees, and green merchantable trees to provide nest sites for a minimum of 60 percent of optimal cavity nester populations, both for present needs and long-term sustainability. This retention level corresponds to approximately 1.4 snags per acre (or 140 snags per 100 acres) in forested habitat.

Meet the 60 percent minimum throughout the Matrix with the requirements met on the average for areas no larger than 40 acres.

Use prescribed fire as a favored tool for site preparation, fuel reduction, and to restore or retain natural ecological processes through site disturbance.

Retain 5 to 10 of the largest (greater than 16 inches diameter at breast height) and healthiest green trees per acre. In addition, maintain a sustainable uneven-aged understory so that there is a variety of different sized trees and species represented throughout the stand available for recruitment.

When an area is regeneration harvested, limit patch size to 3 acres and retain 5 to 10 green trees per acre in the patch.

On lands east of Highway 97, manage range and riparian-wetland areas in the Gerber Block for a mosaic of native plant communities. This mosaic will allow for migration and dispersal of organisms between BLM-administered lands and adjacent U.S. Forest Service lands. Reintroduce fire as a natural disturbance factor through prescribed burning.

## **Special Habitats**

Manage special habitats, such as lakes, talus slopes, meadows, and wetlands (see Table 2-1) to protect their primary habitat values; however, rock quarries could be developed on cliffs or talus slopes not occupied by special status species. Consider wildlife values in the development and rehabilitation of rock quarries. Actions that will benefit wildlife include: constructing cavities for raptors and other species in quarry walls during development, or in abandoned quarries; and piling large boulders at the base of slopes or in waste areas to create cavities for mammals.

Buffer special habitats from surface disturbance and timber harvest if necessary to protect primary values.

Use management practices, including prescribed fire or timber harvest, to obtain desired vegetation conditions in special habitats.

## **Species Specific Action**

**Deer, Elk, and Antelope.** Design thinning projects to maintain existing major game trails free of slash accumulations that impede big game movement.

Conduct forage seeding in habitat areas with appropriate seed beds and where compatible with other management objectives.

Use seasonal restrictions on public use and management activities where needed to minimize disturbance and harassment of herds during critical use periods (for example, birthing areas, winter range, etc.).

Use patch cut harvesting in big game habitat only where silviculturally essential to accomplish relevant forest management or other resource objectives (such as providing small patch openings). Keep existing major game trails slash free in pre-commercial thinning units. Maintain or improve all seasonal ranges throughout the planning area through a variety of habitat projects and practices.

Conduct forage seedings on up to 40 percent of appropriate habitat in harvest areas. Fertilize up to 50 percent of appropriate habitat in deer winter range. Create forage openings up to 5 acres in closed canopy areas. Create and/or maintain forage openings in closed canopy areas on summer and winter ranges. Provide visual barriers up to 25 feet wide along roads in harvest areas. Avoid constructing connecting or

through roads in winter ranges. Continue existing seasonal off-highway vehicle closures in big game winter ranges. On lands available for timber production, maintain 40 percent in hiding and thermal cover.

Conduct thinnings of encroaching juniper to protect and improve forage areas for big game. These thinnings will protect old growth juniper and be designed to consider edge effect, escape cover, and proper unit size.

**Furbearers.** Conduct systematic inventory of furbearers such as pine marten, beaver, and otter.

**Golden Eagle (Protected).** Provide a buffer of up to 30 acres around known and future nest sites and restrict some management activity near nest sites between January 1 and August 31.

**Osprey.** Restrict some management activity within ¼ mile of known nest sites between May 1 and August 1; develop nest structures to improve nesting opportunities in suitable habitat.

Provide snags or green culls for perch/nest sites along all suitable (fish-bearing) waterbodies. Provide up to a 5-acre buffer around known and future nest sites.

**Accipiters.** Provide up to a 15-acre buffer for some management activities around known and future activity centers.

**Prairie Falcon.** Provide up to a 15-acre buffer for some management activities around known and future activity centers.

**Red-tailed Hawk.** Provide up to a 5-acre buffer for some management activities around known and future nest sites.

**Other Raptors.** Maintain the integrity of nest sites and centers of activity.

**Woodpeckers.** Manage for 60 percent of optimum population potential on all lands allocated to timber production. Lands not allocated to timber production will be managed at 100 percent of optimum population potential.

**Sandhill Crane.** Conduct systematic nest surveys and construct artificial nest structures to optimize nesting potential.

Restrict some management activities within 200 feet of nest sites from April 1 to August 1.

**Waterfowl.** Where necessary, acquire water rights, consistent with Oregon State water laws in important waterfowl production areas; as opportunities arise, private lands in important waterfowl habitat will be obtained through exchange or other mutual agreement.

Allow livestock grazing in waterfowl nesting habitat only under guidelines set by an interdisciplinary team process. If necessary, initiate a predator control program to enhance nesting success and production, within guidelines of the established animal damage control environmental impact statement.

**Wild Turkey.** Rehabilitate and improve meadows with native plants and grasses in suitable habitat and plant small food plots with high yield grains and grasses in disturbed areas.

Create and/or maintain open forage areas up to 3 acres in appropriate habitat. Maintain hardwoods to maximize mast production in up to 50 percent of harvested acres. In suitable habitat provide 2 roost sites (approximately ¼ to ½ acre) per 40 acres of harvest area. Minimize open roads and avoid new road construction within ¼ mile of nest and roost sites.

**Other Upland Gamebirds.** Maintain clumps of mature conifers on major ridges to provide winter habitat for grouse. Install guzzlers in cooperation with the Oregon Department of Fish and Wildlife to benefit upland game-birds and other wildlife. Continue to introduce red-legged partridge/chukar, pheasant, and turkey in cooperation with the Oregon Department of Fish and Wildlife.

**Amphibians and Reptiles.** See Special Status Species section.

**Trout.** Develop a coordinated recreation management plan to include tributaries of the Jenny Creek watershed; install instream structures in areas lacking sufficient habitat; stock suitable waterbodies that are below carrying capacity and/or areas above barriers; timber sale contracts would require, when practical, removal of debris that obstructs fish passage or would degrade the stream channel; retain large woody debris in and adjacent to the stream channel; improve trout habitat and/or maintain through minimal impact grazing system; use riparian-wetland enclosures to enhance streamside habitat; remove debris jams that impede migration; modify or replace culverts that block migration; and block up ownership when possible on lands with trout bearing streams.



## Fish Habitat

### Objectives

See Aquatic Conservation Strategy objectives.

Maintain or enhance the fisheries potential of streams and other waters consistent with BLM's Fish and Wildlife 2000 Plan, the Bring Back the Native initiative, and other nationwide initiatives.

Promote the rehabilitation and protection of fish stocks at risk and their habitat.

### Land Use Allocations

There are no specific land use allocations for the fisheries resource. However, Riparian Reserves, Key Watershed provisions, and best management practices (see Appendix F) will assist in meeting fish habitat management objectives. Silvicultural prescriptions, and range management objectives also will help provide good fish management.

Propose fish habitat enhancement projects for Rainbow and Redband Trout which include:

- ◆ A continual supply of large woody debris would be recruited into the stream and into adjacent uplands.
- ◆ Suitable boulders, cull logs, and rootwads would be stockpiled in designated areas during normal work operations for future habitat improvement projects.
- ◆ A cooperative resource management plan would be developed for tributaries of the Jenny Creek watershed and others in conjunction with other agencies and private land owners.
- ◆ The BLM would cooperate with the Oregon Department of Fish and Wildlife and Oregon Department of Fish and Wildlife approved volunteer groups to stock suitable streams with approved brood stock and/or juveniles that are below carrying capacity or above barriers.

### Management Actions/Direction

#### All Land Use Allocations

Apply the management actions/direction in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section.

Use the watershed analysis process to address at-risk fish species and stocks and their habitat for individual watersheds. Where appropriate, fish habitat enhancement opportunities will be identified through this process or through coordinated resource management plans.

Coordinate with the Oregon Department of Fish and Wildlife during planning and implementation of fish habitat enhancement projects. Priority will be given to watersheds supporting at-risk fish species and stocks and those requiring extensive restoration.

As identified through watershed analysis, rehabilitate streams and other waters to enhance natural populations of resident fish. Possible rehabilitation measures will include, but not be limited to, fish passage improvements, instream structures using boulders and log placement to create spawning and rearing habitat, placement of fine and coarse materials for over-wintering habitat, and riparian-wetland rehabilitation to establish or release existing coniferous trees.

Enhance warm water fisheries in reservoirs or ponds where fish populations provide forage for eagles or osprey or where recreational needs can be fulfilled.

### Riparian Reserves

Design and implement fish habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.

Design, construct, and operate fish interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of Aquatic Conservation Strategy objectives. For existing fish interpretive and other user-enhancement facilities inside Riparian Reserves, ensure that Aquatic Conservation Strategy objectives are met. Where Aquatic Conservation Strategy objectives cannot be met, relocate or close such facilities.

Cooperate with federal, tribal, and state fish management agencies to identify and eliminate impacts associated with habitat manipulation, fish stocking, harvest, and poaching that threaten the continued existence and distribution of native fish stocks inhabiting federal lands.

Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of Aquatic Conservation Strategy objectives.

## **Late-Successional/District Designated Reserves**

Design projects to improve conditions for fish if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible.

## **Special Status and Supplemental Environmental Impact Statement Special Attention Species Habitat**

### **Objectives**

See Late-Successional/District Designated Reserve, Riparian Reserve, Matrix, and Special Area objectives.

Protect, manage, and conserve federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species policies.

Manage for the conservation of federal candidate and bureau sensitive species and their habitats so as not to contribute to the need to list and to recover the species.

Manage for the conservation of state listed species and their habitats to assist the state in achieving management objectives.

Protect and manage assessment species where possible so as to not elevate their status to any higher level of concern.

Protect Supplemental Environmental Impact Statement special attention species so as not to elevate their status to any higher level of concern.

Maintain or restore community structure, species composition, and ecological processes of special status plant and animal habitat.

### **Land Use Allocations**

All of the major land allocations in this plan are designed in part to benefit or maintain special status species in the aggregate.

## **Management Actions/Direction**

### **All Land Use Allocations**

#### **Special Status Species**

Protect the following sites from grazing: known and newly discovered sites of the following mollusk species will be protected from grazing by all practicable steps to ensure that the local populations of the species will not be impacted. These species include: *Fluminicola n. sp. 1*, *Fluminicola n. sp. 11*, *Fluminicola n. sp. 19*, *Fluminicola n. sp. 20*, *Fluminicola n. sp. 3*, and *Fluminicola seminalis*. Freshwater mollusks in the family *Hydrobiidae* (to which the genus *Fluminicola* belong) are known to exist in the resource area. Tentative identification of mollusks collected at several sites in the resource area has been made. Further investigation is required for more positive identification of which species of *Fluminicola* are present in the resource area. Implementation of protection actions will be initiated after watershed analysis and appropriate National Environmental Policy Act decisions.

Review all proposed actions to determine whether or not special status species occupy or use the affected area or if habitat for such species is affected.

Conduct field surveys according to protocols and other established procedures. This includes surveying during the proper season unless surveys are deemed unnecessary through watershed analysis, project planning, and environmental assessment. For example, field surveys may not be conducted in all cases depending on the number and timing of previous surveys conducted, whether previous surveys looked for all species that a new survey would look for, and the likelihood of potential habitat. The intensity of field surveys will also vary depending on the same factors.

Consult/conference with or request technical assistance from the U.S. Fish and Wildlife Service or National Marine Fisheries Service for any proposed action which may effect federal listed or proposed species or their critical or essential habitat. Based on the results of consultation/conferencing, modify, relocate, or abandon the proposed action.

Coordinate with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and other appropriate agencies and organizations and jointly endeavor to recover federal listed and proposed plant and animal species and their habitats.



## **Chapter 2 - Description of the Alternatives**

Modify, relocate, or abandon a proposed action to avoid contributing to the need to list federal candidate species, state listed species, or Bureau sensitive species.

Coordinate and cooperate with the state of Oregon to conserve state listed species.

Identify impacts of proposed actions, if any, to bureau assessment species as a whole and clearly describe impacts in environmental analyses. As funding permits and as species conservation dictates, Bureau assessment species will be actively managed.

Retain under federal management, or other appropriate management organization, habitat essential for the survival or recovery of listed species. Retain habitat of candidate or bureau sensitive species where disposal will contribute to the need to list the species.

Where appropriate opportunities exist, acquire land to contribute to recovery, reduce the need to list, or enhance special status species habitat.

Where appropriate, pursue opportunities to increase the number of populations of species under BLM management through land acquisition and/or species reintroduction in coordination with other responsible agencies.

Coordinate with other agencies and groups in management of species across landscapes. Coordination will be accomplished through conservation plans or similar agreements which identify actions to conserve single or multiple species and/or habitats. Such strategies could preclude the need for intensive inventories or modifications to some projects where the conservation plan provides adequate protection for the species and meets the intent of policy.

Where plans exist for species no longer on the special status list, continue with the prescribed conservation actions if determined to be required to avoid relisting or future consideration for listing. In the case of interagency plans or agreements, this determination will be mutually decided. Such plans may be modified as needed based on adequacy of existing range-wide conditions and conservation management.

Pursue opportunities for public education about conservation of species.

In addition to protection of federally listed or proposed threatened or endangered plant or animal species,

manage areas to restore and retain biological diversity to provide protection for clusters of federal candidate category 1 and 2, state listed, Bureau sensitive, and Bureau assessment species. Modify or constrain Bureau management actions and permitted actions to the extent considered necessary to avoid contributing to the need to list federal candidate category 1 and 2, state listed, state candidate, and Bureau sensitive species.

Monitor and manage habitats of federally listed or proposed threatened or endangered species as required by law. Prior to any vegetation or ground manipulation, or any disposal of BLM-administered land, conduct a review of the affected site(s) or tract(s) for such plants and animals.

Conduct general inventories for special status species where needed to determine species distribution and status. Conduct monitoring of these species populations to determine their requirements and trends. Prepare management plans when necessary, and implement active management where needed to prevent listing or to conserve the species. Report population and occurrence data to the Oregon Natural Heritage Program.

### **Listed, Proposed, or Candidate Threatened and Endangered Species**

#### **General**

Implement the land use allocations and management actions/direction of this proposed resource management plan which are designed to enhance and maintain habitat for threatened and endangered species.

#### **Animals**

**Northern Spotted Owl (federal threatened species).** In the Matrix, retain 100 acres of the best northern spotted owl habitat as close as possible to a nest site or owl activity center for all known (as of January 1, 1994) spotted owl activity centers.

Fall no trees within ¼ mile of all active northern spotted owl nest sites from approximately March 1 to September 30 to avoid disturbance and harm to young owls.

With minor exceptions, restrict human activities that could disturb owl nesting, especially use of large power equipment, within ¼ mile of all active spotted owl nest sites from approximately March 1 to September 30. Restrictions on activities will usually not be

required for owl nests and activity centers located near roads or in other areas of permanent human activity.

Continue the Surveyor Mountain study to monitor spotted owl density, northern goshawk, and other old growth species and their response to harvest prescriptions.

**Bald Eagle (federal threatened species).** Protect known and potential habitat sites identified in the *Pacific Bald Eagle Recovery Plan* (U.S. Fish and Wildlife Service 1986).

Provide a buffer of up to 30 acres around nest sites and restrict management activity near nest sites between January 1 and August 31. Coordinate with the Oregon Department of Fish and Wildlife to maintain optimum fish populations in reservoirs providing potential nesting and foraging sites. All management activities will be consistent with objectives identified in the recovery plan and the *Working Implementation Plan for Bald Eagle Recovery in Oregon and Washington* (OR/WA Interagency Wildlife Committee 1990).

Provide snags for perching and protect those snags within ¼ mile of nest, roost, and known forage sites. Retain old growth characteristics in existing and potential habitat, including large trees and snags, to provide for future population expansion. Acquire easements or ownership of private lands within ½ mile of existing or potential habitat that aids in meeting recovery plans; also specifically evaluate acquisition of the Algoma and Swan Lake nest sites as recommended in the recovery plan. Conduct fuels reduction management actions to help reduce potential loss of habitat to catastrophic wildfire occurrences.

Write and implement a site-specific habitat management plan for bald eagle nest sites and major use areas in the Klamath Falls Resource Area, incorporating those management actions identified in the *Working Implementation Plan for Bald Eagle Recovery in Oregon and Washington* (OR/WA Interagency Wildlife Committee 1990) for which the BLM is responsible.

**Peregrine Falcon (federal endangered species).** Comply with the *Pacific Coast Recovery Plan for Peregrine Falcons* (U.S. Fish and Wildlife Service 1986 1982) and any other site-specific habitat management plans.

Provide a buffer of up to 30 acres around known and future sites; survey for presence in potential nesting

habitat and cooperate with the Oregon Department of Fish and Wildlife to reintroduce peregrines into the Klamath River Canyon.

Restrict new roads and other management activities within ½ mile of existing and potential nest sites. Protect potential habitat in cliff areas of upper Klamath River Canyon.

**Northern Goshawk (Federal Candidate Category 2).** Provide up to a 30-acre buffer around known and future activity centers.

**Townsend's Big-eared Bat (Federal Candidate Category 2).** When available, obtain through exchange or other mutual agreement private lands that support bat populations or contain potential habitat. Continue the Salt Caves seasonal habitat closure from May 1 to September 15.

Buffer current and future use sites up to 20 acres. Restrict management activities within ¼ mile of occupied sites.

Conduct an inventory of Townsend's big-eared bats in all potential habitat. To optimize big-eared bat populations, minimize detrimental human disturbance in habitat used by the bat. As opportunities arise, obtain through exchange or other mutual agreement, private lands with habitat that support big-eared bat populations or have the potential for use by the bat.

**Western Sage Grouse (Federal Candidate Category 2).** Conduct surveys in cooperation with the Oregon Department of Fish and Wildlife.

Inventory, monitor, and manage important habitats for those characteristics important for grouse.

Provide a buffer around lek sites up to 20 acres; institute a seasonal restriction on surface disturbing activity of up to ¼ mile around lek sites from March 1 through May 1.

Prohibit the removal of large tracts of sagebrush in and near important sage grouse use areas.

**Amphibians and Reptiles.** Conduct inventories for special status reptiles and amphibians in the planning area. Inventory and documentation of non-status reptiles and amphibians will also take place during this time.

**Shortnose Sucker (Endangered), Lost River Sucker (Endangered), Klamath Largescale Sucker (Candidate), Western Pond Turtle (Candidate).** Provide a buffer of up to 300 feet around waterbodies

## Chapter 2 - Description of the Alternatives

used by these species. Maintain riparian crown cover in accordance with best management practices and riparian-wetland areas.

**Redband Trout (Candidate).** Provide a buffer of up to 300 feet around waterbodies used by this species. Maintain riparian crown cover in accordance with best management practices and riparian-wetland areas.

### Plants

#### *Astragalus applegatei* (federal endangered).

Although there are known populations within the planning area, none of these populations have been found on BLM-administered lands.

### Supplemental Environmental Impact Statement Special Attention Species

#### Survey and Manage

Implement the survey and manage provision of the Supplemental Environmental Impact Statement Record of Decision within the range of Supplemental Environmental Impact Statement special attention species and the particular habitats that they are known to occupy. Appendix E shows which species are covered by this provision, and which of the following four categories and management actions/direction are to be applied to each:

#### Manage known sites (highest priority).

- ◆ Acquire and manage information on these sites, make it available to all project planners, and use it to design or modify activities.
- ◆ Protect known sites. For some species, apply specific management treatments such as prescribed fire.
- ◆ For rare and endemic fungus species, temporarily withdraw known sites from ground-disturbing activities until the sites can be thoroughly surveyed and site-specific measures prescribed.

#### Survey prior to activities and manage sites.

- ◆ Continue existing efforts to survey and manage rare and sensitive species habitat.
- ◆ For species without survey protocols, start immediately to design protocols and implement surveys.
- ◆ Within the known or suspected ranges and within the habitat types of vegetation communities associated with the species, survey for red tree voles and lynx. These surveys will precede the

design of all ground-disturbing activities that will be implemented in 1997 or later.

- ◆ For the other species listed in Appendix E, begin development of survey protocols promptly and proceed with surveys as soon as possible. These surveys will be completed prior to ground-disturbing activities that will be implemented in Fiscal Year 1999 or later. Work to establish habitat requirements and survey protocols may be prioritized relative to the estimated threats to the species as reflected in the Supplemental Environmental Impact Statement.
- ◆ Conduct surveys at a scale most appropriate to the species.
- ◆ Develop management actions/direction to manage habitat for the species on sites where they are located.
- ◆ Incorporate survey protocols and proposed site management in interagency conservation strategies developed as part of ongoing planning efforts coordinated by the Regional Ecosystem Office.

#### Conduct extensive surveys and manage sites.

- ◆ Conduct extensive surveys for the species to find high-priority sites for species management. Specific surveys prior to ground-disturbing activities are not a requirement.
- ◆ Conduct surveys according to a schedule that is most efficient and identify sites for protection at that time.
- ◆ Design these surveys for efficiency and develop standardized protocols.
- ◆ Begin these surveys by 1996.

#### Conduct general regional surveys.

- ◆ Survey to acquire additional information and to determine necessary levels of protection for arthropods, fungi species that were not classed as rare and endemic, bryophytes, and lichens.
- ◆ Initiate these surveys no later than Fiscal Year 1996 and complete them within 10 years.

### Protection Buffers

Provide protection buffers for specific rare and locally endemic species and Supplemental Environmental Impact Statement special attention species in the upland forest matrix. A list of these species and related management actions/direction are presented in

Appendix E and the section on Special Status and Supplemental Environmental Impact Statement Special Attention Species. These species are likely to be assured viability if they occur within reserves. However, there might be occupied locations outside reserves that will be important to protect as well.

Apply the following management actions/direction:

- ◆ Develop survey protocols that will ensure a high likelihood of locating sites occupied by these species.
- ◆ Following development of survey protocols and prior to ground-disturbing activities, conduct surveys within the known or suspected ranges of the species and within the habitat types or vegetation communities occupied by the species. See the previous Survey and Manage section for an implementation schedule.
- ◆ When located, protect the occupied sites of:
  - ◆ Nonvascular plants
  - ◆ Amphibians
  - ◆ Birds
  - ◆ Mammals

**Animals. Roosting Bats.** Conduct surveys to determine the presence of roosting bats, including fringed myotis, silver-haired bats, long-eared myotis, long-legged myotis, and pallid bats. Surveys will be conducted according to protocol defined in the Supplemental Environmental Impact Statement Record of Decision and in any subsequent revisions to protocol.

As an interim measure, allow no timber harvest within 250 feet of sites containing bats. Develop mitigation measures in project or activity plans involving these sites. The intent of these measures is to protect sites from destruction, vandalism, disturbance from road construction or blasting, or any other activity that could change cave or mine temperatures or drainage patterns.

When Townsend's big-eared bats are found on federal land, notify the Oregon Department of Fish and Wildlife. Develop management prescriptions for these sites that include special consideration for potential impacts on this species. See the management actions/direction for Townsend's big-eared bats listed in the Special Status Species section.

### ***Late-Successional/District Designated Reserves***

Design projects for recovery of threatened or endangered animal and plant species even if they result in some reduction of habitat quality for late-successional

species. These projects will be designed for least impact to late-successional species.

Design projects to maintain health of the habitat for the long term.

## **Special Areas**

### **Objectives**

Provide new special areas where needed to maintain or protect important values.

Maintain, protect, or restore relevant and important value(s) of areas of critical environmental concern.

Preserve, protect, or restore native species composition and ecological processes of biological communities (including Oregon Natural Heritage Plan terrestrial and aquatic cells) in research natural areas. These areas will be available for short- or long-term scientific study, research, and education and will serve as a baseline against which human impacts on natural systems can be measured.

Provide and maintain environmental education opportunities in environmental education areas. Control uses to minimize disturbance of educational values.

Protect, maintain, and/or restore botanical and wildlife habitat values in special botanical/wildlife habitat areas.

### **Land Use Allocations**

See Table 2-3.

### **Management Actions/Direction**

Develop site-specific management plans for new special areas as needed. Protect resource values in new areas pending completion of management plans. Management plans will address other possible actions such as land acquisition, use of prescribed fire, and interpretation.

Apply the guidelines of the prevailing land use allocation(s) to candidate areas of critical environmental concern that were dropped from further consideration. See Appendix H for a list of these areas and the land use allocations under which they will be managed.



## Chapter 2 - Description of the Alternatives

Use minimum impact suppression activities during wildfires.

The following areas will be designated areas of critical environmental concern and provided the following management:

- ◆ Miller Creek: 2,000 acres, from Gerber dam to the Goodlow Rim, 200 feet either side of canyon rim. Maintain, protect, or restore natural processes, wildlife, and scenic values. Not available for planned timber harvest; restrict grazing; mineral leasing subject to no surface occupancy; close area to off-highway vehicle use (except Round Valley Road area); provide for primitive and semi-primitive recreation opportunities, including a trail along Miller Creek (see Appendix J for more information on the recreation opportunity spectrum).
- ◆ Upper Klamath River: 4,960 acres, 11 miles of the Klamath River canyon from rim to rim extending from J.C. Boyle powerhouse to the Oregon-California State line. Maintain, protect, or restore historic, cultural, scenic, fisheries, wildlife populations and habitat. Not available for planned timber harvest; limit off-highway vehicle use to designated roads; no developments allowed to enhance the potential for grazing; mineral leasing subject to no surface occupancy, not available for hydroelectric development. Manage area for semi-primitive motorized recreation opportunities (see Appendix J for more information on the recreation opportunity spectrum).

- ◆ Yainax Butte: 720 acres, isolated mountain eight miles south of Beatty, Oregon. Maintain, protect, or restore natural processes and systems. Not available for planned timber harvest; open to grazing, but fence if necessary to protect plant communities from grazing; limit off-highway vehicle use to existing roads; mineral leasing subject to no surface occupancy. Manage area for semi-primitive motorized recreation opportunities (see Appendix J for more information on the recreation opportunity spectrum).

The following area will be designated Areas of Critical Environmental Concern/Research Natural Area:

- ◆ Old Baldy: 520 acres (Klamath Falls Resource Area +160 acres Medford District BLM). High elevation mixed conifer forests and associated brush fields to fill Research Natural Area cell. Preserve, protect, or restore natural processes or system. No timber harvest, firewood, or salvage sales; closed to off-highway vehicle use; area to remain free of cattle use with no developments allowed to enhance the potential for grazing. Mineral leasing subject to no surface occupancy; closed to mineral entry. Manage area for semi-primitive non-motorized recreation opportunities (see Appendix J for more information on the recreation opportunity spectrum).

The following environmental education areas will be provided and maintained:

**Table 2-3. Special Area Allocations**

Special Area Category	Number	Acres
Areas of Critical Environmental Concern <sup>1</sup>	3	7,680
Areas of Critical Environmental Concern/ Research Natural Areas	1	520
Environmental Education Areas	2	180
Special Botanical/Habitat Areas	3	570

<sup>1</sup>This category includes only areas with an area of critical environmental concern designation. Double designated areas, such as areas of critical environmental concern/research natural areas, are not included.

See Map 2-4 for locations.

- ◆ Clover Creek: 30 acres; an area adjacent to a tributary of Spencer Creek used by elementary classes for educational purposes (annual forestry tour). Manage and maintain area for educational values as presented in forestry tour and for recreation. Consider development of adjacent area for parking of large vehicles (busses) and provide day-use facilities. Make parking area available as a winter sno-park. Restrict timber harvest; open to off-highway vehicle use; open to grazing use; mineral leasing subject to no surface occupancy.
- ◆ Surveyor Forest Area: 150 acres; an area adjacent to Surveyor Recreation site, old growth, mixed conifer forest with meadows along the headwaters of Johnson Creek. Manage and maintain educational values, natural processes, scenic values, and wildlife habitat. Not available for planned timber harvest; limit off-highway vehicle use to designated roads; control grazing by fencing; mineral leasing subject to no surface occupancy. Manage area for semi-primitive recreation opportunities. Develop informational, educational, interpretive trail to highlight old growth education and riparian-wetland ecosystems.

The following Special Botanical/Habitat Areas will be protected/maintained and/or restored:

- ◆ Alkali Lake: 240 acres; wetland area in Yonna Valley between Dairy and Bonanza, Oregon. Protect, maintain, and/or restore wildlife habitat area. Open to off-highway vehicle use (no public access); actively pursue land exchange and legal access opportunities; mineral leasing subject to no surface occupancy; control grazing by fencing.
- ◆ Tunnel Creek Wetlands: 280 acres; Lodgepole pine swamp located between Keno Road and Buck Lake. Protect, maintain, and/or restore natural systems or processes. Restrict timber harvest; limit off-highway vehicle use to designated roads; control grazing by fencing; mineral leasing subject to no surface occupancy.
- ◆ Bumpheads: 50 acres; volcanic formations at the south end of the Gerber Block. Preserve, protect, or restore natural processes or system, and scenic resources; limit off-highway vehicle use to existing roads; control grazing by fencing; mineral leasing subject to no surface occupancy.

The following two areas, while not falling into one of the above land use allocations, will receive special

management attention (see Appendix H, Special Areas).

- ◆ Pacific Crest National Scenic Trail
- ◆ Spencer Creek

## **Cultural Resources Including American Indian Values**

### **Objectives**

Identify cultural resource localities and manage them for public, scientific, and cultural heritage purposes.

Conserve and protect designated cultural resources for future generations.

Support ecosystem management by providing information on long-term environmental change and the interactions between humans and the environment in the past.

Fulfill responsibilities to appropriate American Indian groups regarding heritage and religious concerns.

### **Land Use Allocations**

Sites with significant values will be protected from management actions and from vandalism to the extent possible. Cultural resource sites are not mapped in this plan or described in detail due to the sensitivity of resource values.

The Klamath Falls Resource Area manages approximately 250 cultural resource sites, none of which are on the National Register of Historic Places.

### **Management Action/Direction**

Identify and evaluate Native American traditional use areas requiring protection and management during watershed analysis or site-specific planning.

Evaluate cultural resource sites to determine their potential for contributing to public, cultural heritage, and/or scientific purposes. Evaluate the Klamath River Canyon and lands on Bryant Mountain for nomination to the National Register of Historic Places as Archaeological Districts.

Investigate landscape features such as bogs, ponds, and packrat middens, and cultural sites that contain information regarding long-term environmental change.



## Chapter 2 - Description of the Alternatives

Develop mechanisms for describing past landscapes and the role of humans in shaping those landscapes.

Address the management of cultural resources through watershed analyses and project plans.

Develop educational and interpretive programs to increase public awareness and appreciation of cultural resources, as part of the "Adventures in the Past" initiative, and the "Heritage Education" program.

Develop partnerships with local American Indian groups and other interested parties to accomplish cultural resource objectives.

Take appropriate law enforcement or other actions when necessary to protect cultural resources. (Such actions may include physical protection measures such as rripping and barrier installations to reduce deterioration.)

Develop Memoranda Of Understanding with federally recognized Indian tribes and other Indian groups so that their heritage and religious concerns may be appropriately considered. These groups may include but are not limited to the Klamath Tribes, the Shasta Tribe, the Modoc Tribe of Oklahoma, and the Consolidated Modoc and Paiute Tribe.

Acquire significant cultural resource properties for public, cultural heritage, and scientific purposes.

## Visual Resources

### Objectives

Manage all BLM-administered land to meet the following visual quality objectives:

- ♦ Visual Resource Management Class I areas: preserve the existing character of landscapes.
- ♦ Visual Resource Management Class II areas: retain the existing character of landscapes.
- ♦ Visual Resource Management Class III areas: partially retain the existing character of landscapes.
- ♦ Visual Resource Management Class IV areas: allow major modifications of existing character of landscapes.

Emphasize management of scenic resources in selected high-use areas to retain or preserve scenic quality.

## Land Use Allocations

See Table 2-4.

See Map 2-5 for the location of visual resource management classes.

Some of the specific areas by Visual Resource Management class are as follows:

- ♦ Visual Resource Management Class I: None (Since there are no congressionally-designated wilderness areas, rivers designated wild under the National Wild and Scenic Rivers Act, or other such areas, no lands in the Klamath Falls Resource Area will be managed for Visual Resource Management class I).
- ♦ Visual Resource Management Class II: All BLM lands within ¼ mile of Topsy, Surveyor, and Gerber developed recreation sites, the Pacific Crest National Scenic Trail, and Spencer Creek. Also, the Klamath River Complex special recreation management area, Miller Creek Canyon, the upper Klamath Lake viewshed, state scenic waterways and rivers designated Scenic under the National Wild and Scenic Rivers Act will be managed as Visual Resource Management Class II.
- ♦ Visual Resource Management Class III: No less than Visual Resource Management Class III management will be provided within ¼ mile of rural interface areas, state Highways 66 and 140, and U.S. Highway 97.
- ♦ Visual Resource Management Class IV: The Matrix (General Forest Management Area) in the northwest part of the resource area, the Pokegama area south of Highway 66, and the central portion of the Gerber Block will be managed as Visual Resource Management Class IV.

**Table 2-4. Visual Resource Management Classes by Acres.**

Visual Resource Management Class	Acres
I	0
II	33,500
III	81,800
IV	96,700

## **Management Actions/Direction**

Address visual resource management issues when conducting watershed analysis.

Use the visual resource contrast rating system during project level planning to determine whether or not proposed activities will meet Visual Resource Management objectives. Use mitigation measures to reduce visual contrasts.

Provide for natural ecological changes in Visual Resource Management Class I areas. Some very limited management activities may occur in these areas. The level of change to the characteristic landscape should be very low and must not attract attention. Changes should repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Manage Visual Resource Management Class II lands for low levels of change to the characteristic landscape. Management activities may be seen but should not attract the attention of the casual observer. Changes should repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Manage Visual Resource Management Class III lands for moderate levels of change to the characteristic landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements of form, line color, texture, and scale found in the predominant natural features of the characteristic landscape.

Manage Visual Resource Management Class IV lands for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the effect of these activities through careful location, minimal disturbance, and repeating the basic elements of form, line, color, and texture.

## **Wild and Scenic Rivers**

### **Objectives**

Manage designated and suitable segments of the National Wild and Scenic Rivers System by protecting their outstandingly remarkable values. Maintain and enhance the natural integrity of river-related values in designated and suitable river areas.

Find important and manageable river segments suitable for designation where such designation will contribute to the National Wild and Scenic Rivers System. In the Klamath Falls Resource Area, this applies only to the upper Klamath River.

Protect outstandingly remarkable values identified on BLM-administered lands within the study corridors of eligible river segments studied and found suitable for inclusion as components of the National Wild and Scenic Rivers System. This applies only to the upper Klamath River.

Provide interim protective management for outstandingly remarkable values identified on BLM-administered lands along river segments determined eligible but not studied for inclusion as components of the National Wild and Scenic Rivers System.

Manage the natural integrity of river-related values to maintain or enhance the highest tentative classification determined for rivers found eligible or studied for suitability. This applies only to the upper Klamath River.

## **Land Use Allocations**

### ***Designated River Segments***

No designated river segments exist in the Klamath Falls Resource Area.

### ***River Segments Found Suitable for Inclusion in the National System***

The upper Klamath River, 11.0 miles and approximately 4,960 acres is found suitable with tentative scenic classification.

The corridor width for the upper Klamath River Canyon would be from rim-to-rim or ¼-mile from the normal high water mark on each side of the river, whichever is greater. Technically the corridor boundary is not a land use allocation. If the river is designated by the Congress or the Secretary of the Interior (under section 2a(i) of the National Wild and Scenic Rivers Act), it will be automatically added to the allocations of the resource management plan. Currently the upper Klamath River is under consideration by the Secretary of Interior for designation.

See Map 2-6 for segment locations. Reports for river segments found suitable for inclusion in the national system are located in Appendix I. It was the only river segment in the Klamath Falls Resource Area found

## **Chapter 2 - Description of the Alternatives**

suitable for inclusion in the National system. The suitability reports for the eligible river segments that were not found suitable are in Appendix 2-E in the draft Resource Management Plan/Environmental Impact Statement, but were not carried forward to the final Resource Management Plan/Environmental Impact Statement.

### **Management Actions/Direction**

#### **General**

Because it was found to be suitable for inclusion in the National Wild and Scenic Rivers System as a *scenic* river area, provide the following types of interim protection on the upper Klamath River from the John C. Boyle Powerhouse to the Oregon-California state line; exclude timber harvest in the Riparian Reserve, provide Visual Resource Management Class II management in the corridor, and protect the free-flowing values and identified outstandingly remarkable values (recreation, scenic, fish, wildlife, prehistoric, and historic resources, and its value as a Native American traditional use area). Other interim protection guidelines can be found in Appendix I.

Upon completion of the Record of Decision for this Proposed Resource Management Plan, release those rivers found to be eligible but not suitable for inclusion in the national rivers system (segments A and C of Antelope Creek, Barnes Valley Creek, Miller Creek, and Spencer Creek) from interim protection.

#### **Riparian Reserves**

Address attainment of Aquatic Conservation Strategy objectives when developing Wild and Scenic River management plans.

### **Wilderness and Wilderness Study Areas**

#### **Objectives**

Maintain the wilderness character of the Mountain Lakes Wilderness Study Area to comply with the BLM's Wilderness Interim Management Policy.

#### **Land Use Allocations**

The Mountain Lakes Wilderness Study Area is contiguous to the existing Mountain Lakes Wilderness

Area and is a potential addition to this wilderness area.

See Map 2-6 for the location of the Mountain Lakes Wilderness Study Area (330 acres).

### **Management Actions/Direction**

Follow interim management guidelines for wilderness study until decisions are made by the Congress. Authorize no action that will diminish the suitability of these lands as wilderness. Take appropriate actions following Congressional decision.

The President has transmitted his recommendations to the Congress that Mountain Lakes Wilderness Study Area (330 acres) be designated as wilderness and be added to the existing Mountain Lakes Wilderness Area.

If not designated wilderness, the Mountain Lakes Wilderness Study Area (330 acres) will be managed as a Late-Successional/District Designated Reserve. Objectives will be for retention and maintenance of old growth, mature forest, and habitat diversity. Manage the area for primitive and semi-primitive non-motorized recreation opportunities.

### **Rural Interface Areas**

#### **Objectives**

Consider the interests of adjacent and nearby rural land owners, including residents, during analysis, planning and monitoring related to managed rural interface areas. These interests include personal health and safety, improvements to property and quality of life. Determine how land owners might be or are affected by activities on BLM-administered lands.

#### **Land Use Allocations**

Managed rural interface areas encompass approximately 3,500 acres of BLM-administered land within one-quarter mile of private lands zoned for 1- to 5-acre or 5- to 20-acre lots located throughout the district (see Map 2-7 for locations and Table 2-1 for acres).

## Management Actions/Direction

Work with local governments to:

- ◆ Improve the BLM data base regarding private land planning/zoning designations and residential development near BLM-administered land;
- ◆ Provide information to local planners regarding BLM land allocations in rural interface areas and the management objectives and guidelines for these lands;
- ◆ Develop design features and mitigation measures that will minimize the possibility of conflicts between private and federal land management; and
- ◆ Monitor the effectiveness of design features and mitigation measures in rural interface areas.

As a part of watershed analysis and project planning, work with local individuals and groups, including fire protection districts, to identify and address concerns related to possible impacts of proposed management activities on rural interface areas.

Use design features and mitigation measures to avoid/minimize impacts to health, life, and property and quality of life. Examples include different harvest regimes, hand application rather than aerial application of herbicides and pesticides, and hand piling slash for burning of low to moderate intensity prescribed burns. Monitor the effectiveness of design features and mitigation measures.

Eliminate or mitigate public hazards such as abandoned mine tunnels and quarries.

Manage within ¼ mile of rural interface areas using no less than visual resource management Class III standards (unless an area is classified as visual resource management Class I or II).

Reduce unauthorized public use of non-through or "local" roads within rural interface areas and within ¼ mile of existing dwellings. Gates and other types of traffic barriers such as guardrails, berms, ditches, and log barricades will be used as appropriate. These actions are needed to reduce public health and safety hazards, fire risk, vandalism to private property, and will be used on an as needed basis.

Reduce natural fuel hazards on BLM-administered lands in rural interface areas.

## Socioeconomic Conditions

### Objectives

Contribute to local, state, national, and international economies through sustainable use of BLM-administered lands and resources and use of innovative contracting and other implementation strategies.

Provide amenities (for example, recreation facilities, protected special areas, and high quality fisheries) that enhance communities as places to live and work.

### Land Use Allocations

There are no specific land use allocations related to socioeconomic conditions. However, allocations such as the Matrix (General Forest Management Area), recreation facilities, and range lands can assist in meeting socioeconomic objectives.

## Management Actions/Direction

Support and assist the state of Oregon Economic Development Department's efforts to help rural, resource-based communities develop and implement alternative economic strategies as a partial substitute for declining timber-based economies. Aid and support could include: increased coordination with state and local governments and citizens to prioritize BLM management and development activities; increased emphasis on management of special forest/natural products; and recreation development and other activities identified by the BLM and the involved communities as benefiting identified economic strategies.

Improve wildlife and fish habitat to enhance hunting and fishing opportunities and to increase the economic returns generated by these activities.

Improve viewing opportunities for watchable wildlife in the Gerber block area, Klamath River canyon, Topsy recreation site, and other sites as they arise.

Plan and design forest and livestock management activities to produce a sustained yield of products to support local and regional economic activity. A diversity of forest products (timber and non-timber) will be offered to support large and small commercial operations and provide for personal use.

## Recreation

### Objectives

Provide a wide range of developed and dispersed recreation opportunities that contribute to meeting projected recreation demand within the planning area.

Manage scenic, natural and cultural resources to enhance visitor recreation experience expectations and produce satisfied public land users.

Support locally-sponsored tourism initiatives and community economic strategies by providing recreation projects and programs that benefit both short- and long-term implementation. Continue participation in multi-agency recreation program (public and private) to coordinate and promote recreational development and tourism.

Manage off-highway vehicle use on BLM-administered land to protect natural resources, provide visitor safety, and minimize conflicts among various users.

Enhance recreation opportunities provided by existing and proposed watchable wildlife areas and national back country byways.

Continue to provide nonmotorized recreation opportunities and create additional opportunities where consistent with other management objectives.

Manage special and extensive recreation management areas in a manner consistent with the BLM's Recreation 2000 Implementation Plan and Oregon-Washington Public Lands Recreation Initiative.

Continue to provide barrier free or universally accessible recreation facilities and trails as they are constructed or reconstructed.

### Land Use Allocations

See Table 2-5.

See Maps 2-8 and 3-11 in the map packet for locations and Table 3-27 and 3-29 for a list of sites and areas.

## Management Actions/Direction

### General

Enhance travel and recreation management through an increased emphasis on interpretive and informational signs and maps. Develop a resource area recreation guide and travel map for public distribution. Identify on information handouts and bulletins, all major travel routes within the resource area. These actions will support state and local strategies to encourage tourism.

Provide additional informational, educational and recreational opportunities to enhance visitors' experiences, and increase their knowledge of the use and protection of natural resources, the BLM's land management role, and the responsibility of visitors to public lands. Examples of opportunities could include development of nature of multi-purpose trails in the Klamath River Complex Special Recreation Management Area, Surveyor recreation site (Johnson Creek), Spencer Creek area, Hamaker Mountain area, Bryant Mountain area, Stukel Mountain area, Swan Lake Rim, and in the Gerber Block area (Miller Creek and Pothole); development of overnight camping or day-use facilities (hang gliding, target shooting) in the Stukel Mountain area, Hamaker Mountain area, Spencer Creek area, Bryant Mountain area, Gerber Block area; and development of interpretive sites, brochures, and facilities for wildlife, historic or cultural sites, or other natural resources in the Klamath River Complex Special Recreation Management Area, Surveyor Recreation Site, and Gerber Block area. Provide portal and interpretive signs along major public routes. See Table 2-1 for recreation sites, trails, and off-highway vehicle closures. Cooperate with local user groups to provide for coordinated recreation planning, maintenance of facilities, and acquisition of recreation funding.

Manage recreation areas to minimize disturbance to a number of fungus and lichen species known to occur within these areas. Follow survey and manage actions/direction as stated in the introduction to Land Use Allocations and Resource Programs.

### All Land Use Allocations

In addition to the guidelines for late-successional and Riparian Reserves, manage recreation resources in accordance with the guidelines described below.



Table 2-5. Recreation Allocations.

<u>Recreation Management Category</u>	<u>Number</u>	<u>Acres</u>	<u>Miles</u>
Recreation Sites			
Existing	15	450	-----
Proposed	15-50	450-1220	-----
Recreation Trails			
Existing	4	-----	8
Proposed	4-22	-----	8-118
Special Recreation Management Areas			
Existing	2 <sup>1</sup>	7,440 <sup>1</sup>	-----
Proposed	4	20,600	-----
Extensive Recreation Management Areas			
Existing	1	206,000	-----
Proposed	1	185,400	-----
Off-Highway Vehicle Use Areas			
Open	-----	102,100	283
Limited	-----	105,600	150
Closed	-----	4,300	44
Back Country Byways			
Existing	0	-----	-----
Proposed	2	-----	90

<sup>1</sup> The Pacific Crest National Scenic Trail Special Recreation Management Area (40 acres) is jointly managed with the Medford District BLM.

### Recreation Sites and Trails

Continue to operate and maintain fifteen developed and semi-developed recreation sites and four developed trails as listed below:

#### Developed and Semi-Developed Recreation Sites

- ◆ Surveyor Recreation site
- ◆ Topsy Recreation site
- ◆ Gerber Recreation site
- ◆ Klamath River put-in
- ◆ Stan H. Spring campsite
- ◆ Gerber Potholes campsite
- ◆ Miller Creek campsite
- ◆ Wildhorse campsite
- ◆ Upper Midway campsite
- ◆ Basin camp
- ◆ Rock Creek campsite
- ◆ Klamath River BLM campgrounds

- ◆ Lower Klamath Hills day-use area
- ◆ East Gerber Boat ramp
- ◆ Pitchlog Creek campsite

#### Developed Trails

- ◆ Pacific Crest National Scenic Trail
- ◆ Miller Creek dam trail
- ◆ Pederson snowmobile trail
- ◆ Klamath River edge trail

Designate developed recreation sites as fire suppression areas (intensive) and fire fuels management areas. These designations will reduce fire hazards and protect investments. Restrictions on fire suppression equipment and activities or minimum impact methods will be required in the following recreation sites and areas: Surveyor Recreation site and associated old growth areas, Pacific Crest National Scenic Trail, Spencer Creek, Tunnel Creek Wetlands/old growth area, Topsy Recreation site, Klamath River Canyon, Gerber Recreation site, and Miller Creek Canyon.



## Chapter 2 - Description of the Alternatives

Manage timber within developed recreation sites for purposes of removing or topping hazard trees, providing space for additional facilities and activity areas and providing desired regeneration of the forest canopy.

In addition to the 15 developed and semi-developed sites, maintain potential for recreation development in the 35 sites and 18 trail locations listed in Tables 3-29 and 3-30. Develop potential sites and trails as funding and/or recreation partnerships becomes available and if development is consistent with other land use objectives and allocations. Maintain or protect the recreation objectives for development of potential sites and trails by using and/or modifying the silvicultural treatments and harvest designs discussed in the Timber Section. Identify site and trail objectives and issues during watershed analysis or other activity level planning.

Pursue mineral withdrawals for existing developed recreation sites and for proposed recreation sites when development is approved.

### Special Recreation Management Areas

Address special recreation management area issues and prioritize projects in watershed analyses. Prepare project plans as needed. Designated special recreation management areas are described below (see also the Proposed Resource Management Plan map).

Continue to manage and maintain the following existing special recreation management areas will.

- ◆ **Pacific Crest National Scenic Trail Special Recreation Management Area** - 1/2-mile long in the Klamath Falls Resource Area, for hiking and horseback non-motorized use. Maintenance for the Klamath Falls Resource Area section of the trail will continue to be coordinated by the Medford District BLM. Management of the trail will continue to follow the existing Pacific Crest National Scenic Trail Comprehensive Plan. Development of a special recreation management area plan (for both Medford and Lakeview sections of the trail) to be coordinated by Medford District.
- ◆ **The Pacific Crest National Scenic Trail special recreation management area** will receive a new 50-foot wide no timber harvest buffer on either side of the trail and scenic 1/4-mile corridor (Visual Resource Management Class II management, see the Visual Resources Section) on either side of the trail. Mineral leasing subject to no surface occupancy.

- ◆ **Klamath River Complex Special Recreation Management Area** - 7,460 acres will continue to be managed for semi-primitive motorized recreation objectives (see Appendix J for more information on recreation opportunity spectrum). Manage the special recreation management area to emphasize whitewater boating, fishing, and camping along the upper Klamath River. Improve and expand stateline take-out. Improve scouting trails for the Caldera and Hell's Corner rapids. Manage and maintain Topsy recreation site with camping units for overnight and day use visitors; boat ramp; the rafting put-in, and several primitive camping sites along the Klamath River. Continue to follow the cooperative management agreement with the Pacific Power and Light Company for coordinated recreation trail and facility development. Nominate for designation Topsy Road to the National Back Country Byway System. Maintain the Klamath River edge trail for non-motorized use.

- ◆ **Evaluate and update the Klamath River Complex Special Recreation Management Area recreation area management plan.** Provide fire-safe, approved, and developed group campsites. Improve and provide barrier-free access at the Topsy recreation site and BLM campground in the Klamath Canyon. Pursue development of a cooperative management agreement with Klamath and Siskiyou counties to provide minimum annual maintenance on the Topsy Road. Pursue the development of additional nature or multi-purpose trails and an interpretive facility at the powerhouse site.

Manage the following areas as new Special Recreation Management Areas:

- ◆ **Hamaker Mountain.** Manage Hamaker Mountain Special Recreation Management Area for Roaded Natural recreation opportunities (see Appendix J for more information on recreation opportunity spectrum). Design timber management and other activities to enhance future trail and site development, with an emphasis on winter sports and mountain biking. Examples of timber management activities that would enhance recreation would include the development of cleared trails suitable for downhill or cross country skiing. Trails would be replanted with vegetation to benefit wildlife and would be unavailable for future timber harvest. The identification and resolving of specific recreation management issues and prioritization of projects (developed parking areas, designated trails, etc.) will occur during watershed analysis or recreation area

planning. Establish a BLM patrol during winter months to provide visitor assistance on Hamaker Mountain.

- ◆ **Stukel Mountain.** Manage the Stukel Mountain Special Recreation Management Area for semi-primitive motorized and non-motorized recreation opportunities (see Appendix J for more information on recreation opportunity spectrum). The identification and resolving of specific recreation management issues and prioritization of projects (designated off-highway vehicle trails, ease of public access, developed recreation sites, etc.) will occur during watershed analysis or recreation area planning. Improve main road access. Consider development of hang gliding and other facilities for day use and overnight camping.

### **Extensive Recreation Management Areas**

Address extensive recreation management area issues and prioritize projects in watershed analyses. Prepare project plans as needed. The following recreation strategies are proposed in the extensive recreation management areas.

- ◆ Designate the majority of BLM-administered lands in the Klamath Falls Resource Area as an extensive recreation management area (see Glossary). Consistent with BLM's nationwide Recreation 2000 plan, manage lands for a diversity of resources. These lands will continue to be available for dispersed recreation activities, including hunting, fishing, sightseeing, horseback riding, snowmobiling, and hiking when consistent with other resource objectives. Emphasize vehicle-accessible opportunities close to population centers. Open all BLM-administered lands to recreational mineral collection (casual use) unless the area is subject to prior rights, such as mining claims. Maintain and manage the following existing recreation facilities or areas (some in partnership with other agencies or groups) as indicated.
- ◆ Gerber Block - Continue to manage Gerber Recreation site with camping units to accommodate overnight, day use, and mobility impaired visitors; frog camp day use area; and boat ramps. Manage several nearby semi-developed camp sites to provide primitive camping and day use. Manage and maintain the Gerber Watchable Wildlife area tour. In addition, develop or enhance watchable wildlife and other interpretive sites to showcase resource management. Manage area for roaded natural and semi-primitive recreation opportunities (see Appendix J for more information on recreation opportunity spectrum).
- ◆ Miller Creek Trail - Maintain ¼-mile long, for hiking and horseback use, for semi-primitive non-motorized use. Pursue development of additional trail along Miller Creek canyon.
- ◆ Surveyor Recreation Site - Manage camping units to accommodate overnight, day use and mobility impaired visitors; Develop informational, educational, and recreational trails to highlight old growth education areas and riparian-wetland ecosystems. Pursue development of the Old Baldy trail linking the Pacific Crest National Scenic Trail with Surveyor Recreation site. Manage the area for semi-primitive recreation opportunities (see Appendix J for more information on recreation opportunity spectrum).
- ◆ Pederson Snowmobile Trail - 11 mile groomed snowmobile trail connecting with Hyatt Lake of the Wood snowmobile trail. Pursue development of an additional 30 miles of connecting snowmobile trails and sno park at Clover Creek day use area.
- ◆ In the Spencer Creek area, pursue legal access for a barrier-free fishing and hiking trail. Manage the creek for non-motorized use. Resource management will highlight public education about the coordinated resource management plan, the role of fire in ecosystem processes, illegal wood cutting, and other resource activities. Some potential recreation developments include the Clover Creek day use parking area, walk-in campsites along Spencer Creek, and an off-highway vehicle use area in an abandoned rock quarry near Clover Creek.
- ◆ In the Swan Lake Rim area, pursue legal access for a non-motorized trail along the rim. Manage the area for non-motorized use. Provide a trail access/day use area in conjunction with the Oregon, California, and Eastern Rail-Trail, near Dairy, Oregon. Coordinate Swan Lake Rim trail planning with the U.S. Forest Service, Oregon State Parks, and others in accordance with an existing Memorandum of Understanding on the management of the Oregon, California, and Eastern Rail-Trail.
- ◆ In the Bryant Mountain area, manage the area for semi-primitive motorized and non-motorized recreation opportunities (see Appendix J for more information on recreation opportunity spectrum). Pursue development of semi-primitive camping sites at Harpold, Captain Jack, and Smith Reservoirs. Pursue development of non-motorized and designated off-highway vehicle trails.
- ◆ In the Gerber Block area, Bryant Mountain, and other areas, the identification and resolving of

## Chapter 2 - Description of the Alternatives

specific recreation management issues and prioritization of projects will occur during watershed analysis.

- ◆ As opportunities arise, obtain easements and/or land through exchange or other mutual agreements to enhance future recreation management and opportunities. Swan Lake Rim; and Hamaker, Stukel, Bryant, and Hogback mountain areas are among the areas that will be considered for this action.

### Off-Highway Vehicles

Designate the majority of BLM-administered land limited to off-highway vehicle use. The use of off-highway vehicles on BLM-administered lands will be regulated in accordance with the authority and requirements of Executive Orders 11644 and 11989 and regulations contained in 43 Code of Federal Regulations 8340. They require that off-highway vehicle use not cause significant adverse effects to resource values, conflicts between visitors be minimized, public hazards be identified, and public safety be promoted. Some of the existing off-highway vehicle designations will remain unchanged from current management. Areas are designated as open, closed, or limited for off-highway vehicles use (see Glossary for definitions). Off-highway vehicle closed and limited areas would remain open to non-motorized recreation use. See Map 2-9 for more detail.

The following areas will remain closed to off-highway vehicle use:

- ◆ Pacific Crest National Scenic Trail - 3 acres; and
- ◆ Lower Klamath Hills Wildlife area - 1,340 acres.

In addition the following areas will receive new road closures to off-highway vehicles:

- ◆ Spencer Creek;
- ◆ Miller Creek area of critical environmental concern;
- ◆ Old Baldy Research Natural Area;
- ◆ Areas where water quality is being adversely affected; areas where soil erosion or other significant resource damage is occurring (for example, an area receiving off-highway vehicle use affecting threatened or endangered species could be closed to off-highway vehicles). These areas will be identified and any recreation issues resolved during watershed analysis or other activity level planning; and
- ◆ Progeny test sites.

Off-highway vehicle use will be limited to designated roads and trails in the following sites/areas:

- ◆ Klamath River Canyon area of critical environmental concern;
- ◆ Surveyor Mountain area (including Surveyor Recreation site); and
- ◆ Stukel Mountain area.

Off-highway vehicle use will be limited to existing roads and trails in the following sites/areas:

- ◆ Mountain Lakes Wilderness Study Area (an unchanged designation);
- ◆ Yainax Butte area of critical environmental concern;
- ◆ Swan Lake Rim;
- ◆ Bryant Mountain;
- ◆ Gerber Block (including the Gerber recreation site);
- ◆ lands south of Highway 66, outside of the Klamath River Canyon area of critical environmental concern;
- ◆ Topsy recreation site; and
- ◆ Bly Mountain area.

Seasonal off-highway vehicle use limitations will continue in the following areas:

- ◆ Pokegama Wildlife Area (November 20 to April 1); and
- ◆ Klamath Deer Winter Range area (November 1 to April 15).

Seasonal off-highway vehicle use limitations will be added to the following areas:

- ◆ Bryant Mountain (November 1 to April 15)
- ◆ Stukel Mountain (November 1 to April 15)
- ◆ Gerber Block (November 1 to April 15)

Enhance off-highway vehicle use of the following areas:

- ◆ Stukel Mountain;
- ◆ Bryant Mountain;
- ◆ Chase Mountain potential off-highway vehicle trail; and
- ◆ Clover Creek Potential off-highway vehicle trail.

Some possible enhancement measures include easements and/or land will be obtained through exchange or other mutual agreements to enhance future recreation management and opportunities; better informational signing, maps, and patrols; identification of roads needed for primary access and roads for maintaining off-highway vehicle opportunities; minimizing the upgrading of off-highway vehicle roads and trails to areas such as stream crossings and areas receiving active erosion; specific enhancement measures will be addressed in watershed analysis and subsequent project plans. Opportunities to enter into adopt-a-trail agreements with local user groups and the use of Oregon Department of Transportation All-Terrain Vehicle gasoline tax account funds will be pursued.

### **Back Country Byways**

Nominate for designation and facilitate the use of two new National Back Country Byways. Develop interpretive signs, vehicle parking areas, interpretive brochures, etc. for the following potential Back Country Byways (see Map 2-10 for location of proposed trails and byways).

- ◆ Topsy Road Back Country Byway; and
- ◆ Gerber Area Watchable Wildlife Tour/Modoc Trail Back Country Byway.

Coordinate management of Back Country Byways with county governments, chambers of commerce, regional tourism alliances, U.S. Forest Service, and interested private parties.

### **Riparian Reserves**

Design new recreational facilities within Riparian Reserves, including trails and dispersed sites, so as not to prevent meeting Aquatic Conservation Strategy objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impacts to ensure that these do not prevent, and to the extent practicable contribute to, attainment of Aquatic Conservation Strategy objectives.

Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective, eliminate the practice or occupancy.

### **Late-Successional/District Designated Reserves**

Retain and maintain existing recreation developments consistent with other management actions/direction for Late-Successional Reserves.

Use adjustment measures, such as education, use limitations, traffic control devices, or increased maintenance, when dispersed or developed recreation practices retard or prevent attainment of Late-Successional Reserve objectives.

Neither construct nor authorize new facilities that may adversely affect Late-Successional Reserves.

Review on a case-by-case basis new recreation development proposals. They may be approved when adverse effects can be minimized and mitigated.

Locate new recreation developments to avoid degradation of habitat and adverse effects on identified late-successional species.

Remove hazard trees along trails and in developed recreation areas.

## **Forest Condition Restoration (Forest Health Restoration)**

### **Objectives**

Reduce tree mortality and restore the degree of vigor, resiliency, and stability in forest stands which is necessary in order to achieve land use allocation objectives.

### **Land Use Allocations**

There are no specific land use allocations for forest condition restoration. There is the potential for restoration treatment in all allocations. Estimated program acres, potential benefits, and by-products are shown in Figure 2-2.

### **Management Actions/Direction**

#### **All Land Use Allocations**

Design and implement silvicultural treatments in stands that exhibit deteriorating conditions. Treatments are intended to restore the ability of stands to

Forest Condition Restoration Treatment	Acres Proposed for Annual Treatment	Potential Benefits	Potential By-Products <sup>1</sup>
Restoration Thinning	East - 100 West - 240	<ul style="list-style-type: none"> <li>- increased stand vigor</li> <li>- reduced tree mortality</li> <li>- reduce stocking to site capacity.</li> <li>- control of species composition and structure</li> <li>- reduced susceptibility to insect and disease attack and spread</li> </ul>	Timber, chips
Understory Reduction	East - 50 West - 50	<ul style="list-style-type: none"> <li>- increased overstory vigor</li> <li>- reduction in large overstory mortality.</li> <li>- control of species composition and structure.</li> <li>- reduced fuel hazard by reducing ladder fuels</li> </ul>	Timber, chips
Restoration Underburning <sup>2</sup>	East - Up to 3,000 West - Up to 1,000	<ul style="list-style-type: none"> <li>- increased overstory vigor</li> <li>- reduction in large overstory mortality.</li> <li>- control of species composition and structure.</li> <li>- reintroduction of fire as a natural ecosystem component</li> <li>- plant community restoration.</li> </ul>	-----
Plant Community Restoration	East - 25 West - 15	<ul style="list-style-type: none"> <li>- establishment and maintenance of desired species (including herbs, grasses and shrubs).</li> <li>- prevention of the introduction of noxious weeds.</li> </ul>	-----
Restoration Fertilization	East - 50 West - 140	<ul style="list-style-type: none"> <li>- minimization of thinning shock after restoration thinning.</li> <li>- increased stand vigor</li> <li>- reduced susceptibility to insect attack.</li> </ul>	-----

<sup>1</sup> Some potential exists for all treatments (except restoration fertilization for by-products)

<sup>2</sup> Does not include acres to be underburned for fuel hazard reduction.

Figure 2-2. Proposed Forest Condition Restoration Treatments in the Proposed Resource Management Plan.



respond to other management and to reduce the risk of mortality from drought, insects, disease, and wildfire. Treatments will consist of thinning of stands, prescribed fire, forest fertilization, reduction of understory vegetation, reduction of ladder fuels, and restoration of more stable plant communities.

Design forest condition restoration treatments to be consistent with the long-term objectives of the allocation in which the treatment is proposed. Develop treatments in an interdisciplinary manner.

Maintain the natural richness of tree species (conifers and hardwoods).

Develop forest condition restoration treatments at the stand level based on the combination of stand condition and trend, on the functional characteristics of the ecosystem, and on characteristics of the site. Design treatments, as much as possible, to prevent the development of undesirable species composition, species dominance, stand density, or other stand characteristics. Employ the principles of Integrated pest management and integrated vegetation management to avoid the need for direct treatments. Use herbicides only as a last resort.

### ***Riparian Reserves***

Design and implement forest condition restoration treatments in a manner that contributes to the attainment of Aquatic Conservation Strategy objectives.

### ***Late-Successional/District Designated Reserves***

Design and implement forest condition restoration treatments if they provide habitat benefits for late-successional associated species or if the effects on such species are negligible.

Prior to the use of prescribed fire as a forest condition restoration treatment, develop an interdisciplinary fire management plan specifying how prescribed fire applications will meet the objectives of the Late-Successional Reserve. Until the plan is approved, proposed activities will be subject to review by the Regional Ecosystem Office. Apply prescribed fire in a manner which retains the needed amount of coarse woody debris as determined through watershed analysis.

### ***Matrix (General Forest Management Area) - West and East Sides***

Retain snags within forest condition restoration treatment units at levels sufficient to support species of cavity-nesting birds at 60 percent of potential population levels. Meet the 60 percent minimum throughout the Matrix with per acre requirements met on average areas no larger than 40 acres.

Special Habitats. In project areas containing special wildlife habitats (for example, talus and meadows) maintain 100 to 200 foot buffers around the special habitat. This could be increased, decreased, or manipulated based on site-specific circumstances. Ecologically significant buffers will be determined by interdisciplinary teams.

## **Timber Resources**

### **Objectives**

Provide a sustainable supply of timber and other forest products while maintaining a healthy, functioning ecosystem.

Manage developing stands on available lands to promote tree survival and growth and to achieve a balance between wood volume production, quality of wood, and timber value at harvest.

Manage timber stands to reduce the risk of stand loss from fires, animals, insects, and diseases.

Provide for salvage harvest of timber killed or damaged by events such as wildfire, windstorms, insects, or disease, consistent with management objectives for other resources.

### **Land Use Allocations**

Lands available for scheduled timber harvest are shown in Table 2-6.

The general forest management area lands are available for restricted timber production only (see also Table 2-1). Restricted timber production refers to management of forest stands for purposes other than intensive commodity production, such as development of old growth habitat, visual quality, or ecosystem stability and maintenance.



## Management Actions/Direction

### *Matrix (General Forest Management Area) - West and East Sides*

Determine the probable level of harvest based on the productivity of lands available for timber production and on the silvicultural treatments planned for these lands.

Maintain a well distributed pattern of early and mid-seral forest across the Matrix.

Apply silvicultural systems that are planned to produce, over time, forests which have desired species composition, structural characteristics, and distribution of seral or age classes (see Appendix G).

Develop plans for the locations and specific designs of timber harvests and other silvicultural treatments within the framework of watershed analyses (see Appendix G).

Select logging systems based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for protection of soil and water quality, and for meeting other land use objectives.

Base silvicultural treatments and harvest designs on the functional characteristics of the ecosystem and on the characteristics of each forest stand and site. Treatments will be designed, as much as possible, to prevent the development of undesirable species composition, species dominance, or other stand characteristics. The principles of integrated pest management and integrated vegetation management will be applied to avoid the need for direct treatments. Herbicides will be used only as a last resort.

**Unscheduled Harvests.** Manage suitable and nonsuitable woodlands (all categories) for resource values other than sustained timber production. Other forest lands not subject to planned harvest include existing high-use recreation sites, riparian-wetland areas, Mountain Lakes Wilderness Study Area, proposed area of critical environmental concern, an area adjacent to the Pacific Crest Trail, bald eagle and peregrine falcon nest site protection areas, and identified cultural sites. Plan unscheduled harvest to manipulate stand density, composition, fuel loads, or other features where the resulting stand will improve forest ecological condition, wildlife habitat, or other resource values. Specifically, plan harvest of marketable western juniper woodlands for improvement of forest or range land ecosystem or watershed conditions. Up to 1,000 acres per year of juniper woodland

**Table 2-6. Matrix Timber Allocations.**

<u>Land Use Allocation</u>	Approx. Acres	
	<u>West side</u>	<u>East side</u>
Matrix (General Forest Management Areas-including visual resource management class II, rural interface, and TPCC restricted)	23,550	8,750

could be harvested for commercial forest products. See also Riparian Reserves and Late-Successional/District Designated Reserves sections.

Apply the management actions/direction in the Riparian Reserves, Late-Successional/District Designated Reserves, and Special Status and Supplemental Environmental Impact Statement Special Attention Species section. Appendix G describes the silvicultural systems to be applied to available forest lands.

On the east side, retain 5 to 10 of the largest (greater than 16 inches diameter at breast height) and healthiest green trees per acre. In addition, maintain a sustainable uneven-aged understory so that there is a variety of different sized trees and species represented throughout the stand available for recruitment.

On the west side, retain 16 to 25 large green trees per acre in harvest units.

Retain late-successional forest patches in landscape areas where little late-successional forest persists. This management action/direction will be applied in fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest. (The assessment of 15 percent will include all federal land allocations in a watershed.) Within such an area, protect all remaining late-successional forest stands. Protection of these stands could be modified in the future when other portions of a watershed have recovered to the point where they could replace the ecological roles of these stands.

Retain snags within a timber harvest unit at levels sufficient to support species of cavity-nesting birds at 60 percent of potential population levels. Meet the 60 percent minimum throughout the Matrix with per acre requirements met on average areas no larger than 40 acres.

On the west side, leave 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long. On the east side, leave 50 linear feet of logs per acre greater than or equal to 12 inches in diameter and 8 feet long. Existing decay class 1 and 2 logs count toward this requirement. Down logs will reflect the species mix of original stands. Where this management action/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit.

Within identified sensitive rural interface areas, alter forest management practices, where realistically feasible, to mitigate adjacent landowner concerns. Practices used will be consistent with sustained yield.

**Special Habitats.** In project areas containing special wildlife habitats (for example, talus and meadows) maintain 100 to 200 foot buffers around the special habitat. This could be increased, decreased, or manipulated based on site-specific circumstances. Ecologically significant buffers will be determined by interdisciplinary teams.

## **Special Forest/Natural Products**

### **Objectives**

Manage for the production and sale of special forest/natural products (see Glossary) when demand is present and where actions taken are consistent with primary objectives for the land use allocation.

Use the principles of ecosystem management to guide the management and harvest of special forest/natural products.

### **Land Use Allocations**

No land use allocations are made specifically for special forest/natural products.

### **Management Actions/Direction**

#### ***All Land Use Allocations***

Allow harvest of special forest/natural products throughout the resource area but apply the area and plant species/group restrictions as shown in Table 2-7.

Establish specific guidelines for the management of individual special forest products using interdisciplinary review as needed. Management guidelines will be based on the ecological characteristics of the special forest product species and the requirements of associated plant, animal, and fungal species. Guidelines will include methods of harvest and provisions that minimize changes in site productivity. Monitoring of harvest activities and the effects of harvest will be part of special forest product management. Feasibility to harvest newly identified special forest product species will receive interdisciplinary review.

In appropriate areas (for example, the Matrix) manage hardwood stands originating from nonhuman causes for the continued production and sale of hardwood timber and products.

Limit harvests of fuelwood and posts.

### ***Riparian Reserves***

Where catastrophic events result in degraded riparian conditions, allow fuelwood cutting if required to attain Aquatic Conservation Strategy objectives.

### ***Late-Successional/District Designated Reserves***

Permit fuelwood gathering only in existing cull decks, in areas where green trees are marked by silviculturists for thinning, in areas where blowdown is blocking roads, and in recently harvested timber sale units where down material will impede scheduled post-sale activities or pose an unacceptable risk of future large scale disturbance. In all cases, these activities will comply with management actions/direction for Late-Successional/District Designated Reserves.

Evaluate whether special forest product harvest activities have adverse effects on Late-Successional/District Designated Reserves objectives.

Prior to selling special forest products, ensure resource sustainability and protection of other resource values such as special status plants or animal species.

Where special forest product activities are extensive, evaluate whether they have significant effects on late-successional habitat. Restrictions may be appropriate in some cases.

Table 2-7. Special Forest/Natural Products.

Area	Limited Harvest	No Harvest
Areas of critical environmental concern	X	
Research natural areas		X
Environmental education areas	X	
Special habitats		X
White oak woodlands	X	
Developed recreation sites	X	
Known cultural resource sites		X
Wetlands	X	
Fragile soils areas	X	
Special status fauna or flora sites		X
Late-Successional/District Designated Reserve Buffers	X	
Late-Successional/District Designated Reserves		X
Riparian Reserves	X	
Key Watersheds	X	
Wilderness Study Area		X
Plant Species or Group		
Lily family ( <i>Liliaceae</i> )	X	
Orchid family ( <i>Orchidaceae</i> )	X	
Iris family ( <i>Iridaceae</i> ) except common iris	X	
Special status plant species		X
Lichens	X	
Ferns	X	
Conifer boughs	X	
Mosses	X	
Mushrooms	X	
Cones	X	
Mushrooms	X	
Incense Cedar Boughs	X	
Christmas Trees	X	
Juniper Boughs	X	
Manzanita Boughs	X	
Juniper Seedlings	X	
Aspen Seedlings	X	
Pacific Yew		X

## **Energy and Minerals**

### **Objectives**

Maintain exploration and development opportunities for leasable and locatable energy and mineral resources.

Provide opportunities for extraction of salable minerals by other government entities, private industry, individuals, and nonprofit organizations.

Continue to make available mineral resources on the reserved federal mineral estate.

### **Land Use Allocations**

See Table 2-1, Proposed Resource Management Plan, for energy and mineral allocations. The acreages given in these tables and the discussion below are approximate. Overlapping restrictions from different land use allocations have been taken into consideration, and where this occurs, the most restrictive constraint was used.

**Locatable Minerals.** Approximately 191,600 acres of the 235,900 acres of federally-owned locatable minerals will be open to mining claim location and operation subject to standard requirements. Another 37,900 acres will be subject to additional restrictions. About 5,800 acres will continue to be withdrawn from mineral entry, with an additional 1,500 acres withdrawn from nonmetalliferous mineral entry. The Old Baldy Research Natural Area will be recommended for withdrawal (600 acres). See Table 2-8.

**Leasable Minerals.** Approximately 197,600 acres of the 238,700 acres of federally-owned oil and gas and 237,300 acres of federally-owned geothermal resources will be available for leasing subject to restrictions. No surface occupancy stipulations will be imposed on another 40,800 acres of oil and gas and geothermal resources. Leasing will not be allowed within the 300 acre Mountain Lakes Wilderness Study Area (see Table 2-9).

**Salable Minerals.** Approximately 222,500 acres of the 237,300 acres of federally-owned salable minerals will be open to mineral material disposal subject to restrictions. About 14,800 acres will be unavailable for mineral material disposal in order to protect important resource values and special investments (see Table 2-10).

### **Management Actions/Direction**

See Tables 2-8, 2-9, and 2-10 for restrictions on energy and mineral activities and Appendix K for leasing notices and stipulations, and operating standards pertinent to locatable and salable minerals.

### **All Land Use Allocations**

#### **Leasable Minerals**

Use special stipulations for oil, gas and geothermal leases to protect fragile areas or critical resource values (see Appendix K for a list of mineral restrictions by resource value). Special stipulations may include seasonal restrictions to protect resources such as critical wildlife habitat, prevent excessive erosion, etc.; controlled surface use stipulations to protect valuable resources in small areas; and no surface occupancy stipulations to protect valuable resources scattered over a large area while still providing an opportunity for exploration and development. Special stipulations may be waived by authorized BLM officials if the objective of a stipulation could be met in another way.

#### **Locatable Minerals**

Use general requirements in 43 Code of Federal Regulations 3809 and site-specific guidelines to avoid unnecessary or undue degradation of resources on mining claims.

Require reclamation at the earliest feasible time for all surface-disturbing operations, whether conducted under a notice or approved plan of operations.

#### **Salable Minerals**

Address quarry development, management, and reclamation needs through implementation planning.

Emphasize long-term regional quarry use.

Develop new quarry sites in locations consistent with overall management objectives and guidelines of the proposed resource management plan.

Continue to use rock from existing quarries for construction and maintenance of timber sale access roads and other purposes.

### **Riparian Reserves**

NOTE: The following management actions/direction differ from the standards and guidelines in the

Table 2-8. Locatable Mineral Restrictions (acres)

	Closed Nondiscretionary	Closed Discretionary	Open - With Standard Requirements	Open - With Additional Restrictions
PRMP	4,700	700	191,600	37,900

<sup>1</sup> Existing withdrawals, Federal Energy Regulatory Commission power project permits and licenses in effect. Includes 1,500 acres closed to non-metalliferous mining only.

<sup>2</sup> Recreation and Public Purposes Act lease, Old Baldy proposed withdrawal.

<sup>3</sup> Powersite reserves, off-highway vehicle closures, wilderness study areas, designated or suitable scenic/recreational rivers, areas of critical environmental concern and research natural areas, some cultural resources sites, federal mineral estate only, special management areas, and special recreation management areas.

Table 2-9. Oil and Gas and Geothermal Lease Restrictions (acres)

	Closed Nondiscretionary	Closed Discretionary	Open - No Surface Occupancy	Open - With Standard Terms	Open - With Additional Stipulations
PRMP	300	0	40,800	0	197,600

<sup>1</sup> Congressional and other agency withdrawals, and wilderness study areas.

<sup>2</sup> Administrative sites, including recreation sites and progeny test sites; Recreation and Public Purposes Act leases; some areas of critical environmental concern; some special management areas; some special recreation management areas; research natural areas; threatened and endangered species habitat; some cultural resources sites; Late-Successional/District Designated Reserve (PRMP); and Riparian Resources (PRMP).

<sup>3</sup> Proposed or existing BLM withdrawals; powersite withdrawals; seasonal wildlife restrictions; Riparian Reserves; corridors of rivers designated as, or suitable for, designation as scenic or recreational; rural interface areas; Visual Resource Management Class II areas; off-highway vehicle restricted areas; federal mineral estate; wetlands; and Late-Successional/District Designated Reserve buffers. Subtract 1,400 acres across all alternatives for geothermal resources.

Table 2-10. Locatable Mineral Restrictions (acres)

	Closed Nondiscretionary	Closed Discretionary	Open - With Standard Requirements	Open - With Additional Restrictions
PRMP	300	14,500	0	222,500

<sup>1</sup> Wilderness study area.

<sup>2</sup> Proposed or existing withdrawals; areas of critical environmental concern; research natural areas; special management areas; special recreation management areas; corridors of rivers suitable for designation as scenic or recreational; Recreation and Public Purposes Act leases; habitat for sensitive, threatened, or endangered species of plants and animals; Visual Resource Management Class I; administrative sites (not withdrawn); cultural resource sites; wetlands; and Late-Successional/District Designated Reserves.

<sup>3</sup> Federal mineral estate only, rural interface areas, seasonal wildlife restrictions, Visual Resource Management Class II, powersite withdrawals, Riparian Reserves, off-highway vehicle closures, and Late-Successional/District Designated Reserves.



Supplemental Environmental Impact Statement Record of Decision since the standards and guidelines are not all implementable under current laws and regulations. The stronger standards and guidelines in the Supplemental Environmental Impact Statement Record of Decision (Appendix D) will be adopted at such time as changes in current laws and/or regulations authorize their implementation.

For any proposed locatable mining operation in Riparian Reserves, other than notice level or casual use, require the following actions by the operator consistent with 43 Code of Federal Regulations 3809:

- ◆ Prepare a Plan of Operations, including a reclamation plan and reclamation bond for all mining operations in Riparian Reserves. Such plans and bonds will address the costs of removing facilities, equipment, and materials; recontouring of disturbed areas to an approved topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvaging and replacing topsoil; and revegetating to meet Aquatic Conservation Strategy objectives.
- ◆ Locate structures, support facilities, and roads outside Riparian Reserves. If no alternative to siting facilities in Riparian Reserves exists, locate in a way compatible with Aquatic Conservation Strategy objectives. Road construction will be kept to the minimum necessary for the approved mineral activity. Roads will be constructed and maintained to meet road management standards and to minimize damage to resources in Riparian Reserves. When a road is no longer required for mineral or land management activities, it will be reclaimed. In any case, access roads will be constructed consistent with 43 Code of Federal Regulations 3809 and acceptable road construction standards and will minimize damage to resources in Riparian Reserves.
- ◆ Avoid locating solid and sanitary waste facilities in Riparian Reserves. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Reserves exists, releases can be prevented, and stability can be ensured, then:
  - ◆ Analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics.
  - ◆ Locate and design the waste facilities using best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such

releases and ensure stability over the long term, prohibit such facilities in Riparian Reserves.

- ◆ Reclaim waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
- ◆ Monitor waste and waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
- ◆ Require reclamation bonds adequate to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
- ◆ Where an existing operator is in noncompliance at the notice level (that is, causing unnecessary or undue degradation), require actions similar to those stated above to meet the intent of 43 Code of Federal Regulations 3809.

For future leasable mineral activity in Riparian Reserves, prohibit surface occupancy for oil, gas, and geothermal exploration and development activities unless it can be demonstrated that impacts will be acceptable or can be mitigated so that the objectives of the Aquatic Conservation Strategy can be met. Where possible, adjust the stipulations in existing leases to eliminate impacts that retard or prevent the attainment of Aquatic Conservation Strategy objectives, consistent with existing lease terms and stipulations.

Allow development of salable minerals, such as sand and gravel, within Riparian Reserves only if Aquatic Conservation Strategy objectives can be met.

Develop inspection and monitoring requirements and include such requirements in exploration and mining plans and in leases or permits consistent with existing laws and regulations. Evaluate the results of inspection and monitoring to determine if modification of plans, leases and permits is needed to eliminate impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

### ***Late-Successional/District Designated Reserves***

Assess the impacts of ongoing and proposed mining activities in Late-Successional/District Designated Reserves.

Include stipulations in mineral leases and, when legally possible, require operational constraints for locatable mineral activities to minimize detrimental effects on late-successional habitat.



## Grazing Management

### Objectives

Provide for livestock grazing in an environmentally sensitive manner, consistent with other objectives and land use allocations. Resolve resource conflicts and concerns and ensure that livestock grazing use is consistent with the objectives and direction found in Appendix L (Grazing Management)

Integrate the appropriate state specific "Standards and Guidelines for Livestock Grazing" (when determined), into the resource areas grazing program, to ensure ecological health and conditions concurrent with livestock grazing.

Provide for range land improvement projects and management practices, consistent with other objectives and land use allocations.

### Land Use Allocations

Provide for initial levels of livestock grazing within the parameters outlined, by allotment, in Appendix L. Changes in this plan's grazing use will be done as described in the monitoring and evaluation discussion in the Management Actions/Directions section below.

The actual geographical area defined and allocated for each allotment is found on Map 3-17 in the map packet. More specific allotment boundaries and legal delineations are found within the grazing allotment files located in the Klamath Falls Resource Area office. Areas within allotments which are specifically excluded from livestock grazing are listed in Appendix L.

### Management Actions/Direction

#### General

Implement the grazing management program as guided by the collection of vegetative monitoring data, and as outlined in the 1988 Oregon Rangeland Monitoring Handbook (H-1732-2), the Manual Handbooks (4000 series), BLM Technical References 1737 and 4400 series, the resource area's *Coordinated Monitoring and Evaluation Plan for Grazing Allotments*, and other applicable policies and direction. Appendix L, provides an overview of the resource areas monitoring program.

Adjust grazing use (including, but not limited to, changes in season-of-use, kinds and classes of

livestock, numbers of animals, grazing capacity, management facilities needed) based on and supported by the ongoing range land studies performed in accordance with the above guidance. Review the results of these studies by an interdisciplinary team of resource specialists through the allotment evaluation process. Recommend future management actions (in consultation, coordination, and cooperation with the affected interests) to the Area Manager for review, modification, and/or approval. When necessary, implement changes in permitted use through written agreement or decision. An allotment management plan may be completed, or revised where one exists, after an evaluation to implement management changes, propose additional range improvements, set more specific resource objectives, or modify other aspects of the grazing use as allowed by policy and regulations. Temporary non-use for all or a portion of the grazing on an allotment may be approved by the Area Manager, on a year-to-year basis, as needed to meet the management objectives of this plan or to meet the needs of grazing users. Temporary non-renewable grazing use may also be approved if resource conditions warrant it and the management objectives of this plan are met.

Monitoring studies and evaluations will be, at a minimum, done on a schedule as outlined in the Oregon Rangeland Monitoring Handbook (H-1734-2). Current direction is to perform an allotment evaluation every 5 years for "I" category allotments and every 10 years for "M" category allotments. "C" category allotments will be monitored and evaluated as needed.

Continue to develop short-duration, high-intensity grazing systems on section 3 grazing lands in the Gerber Block to improve riparian and wetland resources. Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient vegetation for maintenance of plant vigor and streambank protection. More specifics are found in Appendix L, *Grazing in Riparian-Wetland Areas* Section, and in the Soils Section earlier in this chapter.

Additional and future guidance, pertinent to the livestock grazing program, will be incorporated into the resource areas grazing program, as applicable. The primary example of this will be the state specific *Standards and Guidelines for Livestock Grazing*, which are expected to be implemented in the next two or three years, as a result of Rangeland Reform '94. Additionally, any requirements, goals, and objectives devised as a result of the Eastside Ecosystem Management Project will be incorporated into the resource area's grazing management program as appropriate.

Construct range land improvements as needed to support achievement of management objectives. Range land improvements may include, but are not limited to fence and reservoir construction, spring developments, vegetation manipulation, and prescribed burns. See Appendix L for a listing of proposed range land improvements, for each grazing allotment, predicted to be necessary at this time. This does not preclude proposing and implementation of additional or different range land improvement projects in the future as necessary to support achievement of resource objectives.

### **Riparian Reserves**

Adjust or eliminate grazing practices that retard or prevent attainment of Aquatic Conservation Strategy objectives, through a planning and environmental analysis process appropriate to the action.

Locate new livestock handling and/or management facilities outside Riparian Reserves. Ensure that Aquatic Conservation Strategy objectives are met for existing livestock handling facilities inside Riparian Reserves. Where these objectives cannot be met, require relocation or removal of such facilities.

Limit livestock trailing, bedding, watering, loading, and other handling efforts to those areas and times that will ensure Aquatic Conservation Strategy objectives are met.

Protect the following sites from grazing: known and newly discovered sites of the following mollusk species will be protected from grazing by all practicable steps to ensure that the local populations of the species will not be impacted. These species include: *Fluminicola* n. sp. 1, *Fluminicola* n. sp. 11, *Fluminicola* n. sp. 19, *Fluminicola* n. sp. 20, *Fluminicola* n. sp. 3, and *Fluminicola* *seminalis*. Freshwater mollusks in the family *Hydrobiidae* (to which the genus *Fluminicola* belong) are known to exist in the resource area. Tentative identification of mollusks collected at several sites in the resource area has been made. Further investigation is required for more positive identification of which species of *Fluminicola* are present in the resource area. Implementation of protection actions will be initiated after watershed analysis and appropriate National Environmental Policy Act decisions.

### **Late-Successional/District Designated Reserves**

In coordination with wildlife and fish biologists, implement range-related management activities that do not adversely affect late-successional habitat.

Adjust or eliminate grazing practices that retard or prevent attainment of Late-Successional/District Designated Reserve objectives through a planning and environmental analysis process appropriate to the action.

Evaluate effects of existing and proposed livestock management and handling facilities in Late-Successional/District Designated Reserves to determine if reserve objectives are met. Where objectives cannot be met, relocate livestock management and/or handling facilities.

## **Wild Horse Management**

### **Objectives**

Manage the Pokegama Wild Horse Herd in accordance with the Appropriate Management Level to ensure or enhance a thriving natural ecological balance between the wild horse population, wildlife, livestock, and the vegetation, and to protect the range from deterioration associated with overpopulation.

Provide for wild horse grazing in an environmentally sensitive manner, consistent with other objectives and land use allocations. Wild horse grazing use will be consistent with the objectives found in Appendix L, General Allowable Use Guidelines, Livestock Grazing in Riparian-Wetland Areas, and Allotment Management Summaries, and in the Water and Soils Section earlier in the Chapter.

Also, provide for range land improvement and management practices, that in whole or part are beneficial to wild horses, consistent with other objectives and land use allocations.

### **Land Use Allocations**

The initial appropriate management level for the Pokegama herd management area, under this plan, will be 30 to 50 head. This number is based on the determination made when the Herd Management Area Plan was written in 1978 and current professional judgement of the grazing capacities of the herd management area.

Within the Pokegama herd management area, 150 animal unit months of forage are allocated for wild horse use. The numbers of animal unit months allocated, by allotment, are found in Appendix L, Allotment Management Summaries. This animal unit

## Chapter 2 - Description of the Alternatives

months figure reflects the land distribution pattern within the herd management area where 20 percent of the lands are BLM-administered and 80 percent are private. All wild horse use, within the resource area, is in the Dixie (0107) and Edge Creek (0102) Allotments.

### Management Actions/Directions

The range land monitoring studies outlined in the Livestock Grazing section and explained in Appendix L, Range Land Monitoring and Evaluation Section, will be used to collect information on the vegetative/riparian affects of grazing, including wild horses, and to determine if the objectives for wild horse management are being met or not.

Base future adjustments in the appropriate management level on an evaluation of range land monitoring data (this process is also summarized in Appendix L). If the evaluation(s) show that wild horse numbers are exceeding the forage carrying capacity within their range, are responsible for unacceptable damage to soils or riparian-wetland areas, or become a management problem to the private land owners in the area, initiate control measures to return the horse numbers to the appropriate management level determined through those evaluations.

Revise and update the 1976 Pokegama Herd Management Area Plan based on current information, conditions, and herd management area plan standards.

Make aerial reconnaissance flights and/or ground survey of the herd management area every two to three years to census the wild horse numbers.

Establish areas with mineral and salt licks away from streams, riparian-wetland areas, and wildlife guzzlers (artificial structures that collect rain water and then regulate the flow to a drinking basin).

Apply the management actions/direction in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section.

### Land Tenure Adjustments

#### Objectives

Make land tenure adjustments to benefit a variety of uses and values. Emphasize opportunities that conserve biological diversity, enhance ecosystem management, or improve management efficiency.

Meet the following objectives for the three land tenure adjustment zones:

- ♦ **Zone 1:** generally, retain these lands under BLM administration.
- ♦ **Zone 2:** "block up" areas in Zone 2 with significant resource values and exchange other lands in Zone 2 to "block up" areas in Zones 1 and 2 with significant resource values.
- ♦ **Zone 3:** retain lands with unique resource values; dispose of other lands in this zone using appropriate disposal mechanisms.

Make BLM-administered lands in Zones 1, 2, and 3 available for a variety of uses as authorized by section 302 of the Federal Land Policy and Management Act, the Recreation and Public Purposes Act, and special recreation permits.

Manage newly acquired lands for the purpose for which they are acquired or consistent with the management objectives for adjacent BLM-administered lands. If lands with unique or fragile resource values are acquired, protect those values until the next plan revision.

Eliminate unauthorized use of BLM-administered land.

### Land Use Allocations

<u>Zone</u>	<u>Acres</u>
Zone 1	186,000
Zone 2	3,000
Zone 3	23,000

See Map 2-11 for location of land tenure zones. See Appendix M for legal descriptions of Zone 3 lands.

### Management Actions/Direction

#### All Land Use Allocations

Use the land tenure adjustment criteria shown in Appendix M when conducting environmental analyses for site-specific proposals. Application of these criteria may result in retention of some Zone 2 or 3 lands.

Maintain or increase public land holdings in Zone 1 by retaining public lands and acquiring nonfederal lands with high public resource values. The primary mode of acquisition will be through exchange of BLM-administered lands in Zones 2 and 3. Utilize purchases and donations if exchange is not feasible.

Consult with county governments prior to any land exchange.

Consider the effect of land tenure adjustments on the mineral estate. If the lands are not known to have mineral potential, the mineral estate will normally be transferred simultaneously with the surface estate.

Minimize impact on local tax base by emphasizing exchanges rather than fee purchase.

Make exchanges to enhance public resource values and/or improve land patterns and management capabilities of both private and BLM-administered land within the planning area by consolidating ownership and reducing the potential for land use conflict.

Consider transfer of BLM-administered land to other Federal agencies or acquisition of other federal lands where consistent with public land management policy and where improved management efficiency will result.

Consider conveying the subsurface mineral interest owned by the United States to the existing or proposed owner of the surface estate consistent with the Federal Land Policy and Management Act Section 209(b).

Prohibit disposal of Zone 2 lands through sales under Section 203(a) of the Federal Land Policy and Management Act. Zone 2 lands may be transferred to other public agencies or managed under some form of cooperative agreement. Zone 2 lands will generally remain under BLM administration.

Dispose of Zone 3 lands through sale under Section 203(a) of the Federal Land Policy and Management Act if no viable exchange proposals can be identified. Zone 3 lands could also be transferred to another Federal agency or state or local government as needed, to accommodate community expansion or other public purposes.

### ***Riparian Reserves***

Use land acquisition, exchange, and conservation easements to meet Aquatic Conservation Strategy objectives and facilitate restoration of fish stocks and other species at risk of extinction.

### ***Late-Successional/District Designated Reserves***

Consider land exchanges when they will provide benefits equal to or better than current conditions.

Consider land exchanges especially to improve area, distribution, and quality (for example, connectivity,

shape, and contribution to biodiversity) of Late-Successional/District Designated Reserves and where public and private lands are intermingled.

## **Rights-of-Way**

### **Objectives**

Continue to make BLM-administered lands available for needed rights-of-way where consistent with local comprehensive plans, Oregon statewide planning goals and rules, and the exclusion and avoidance areas identified in this Proposed Resource Management Plan.

Ensure that all rights-of-way for hydroelectric development are consistent with the Northwest Power Planning Council guidance, which recommends prohibiting future hydroelectric development on certain rivers and streams with significant fisheries and wildlife values.

### **Land Use Allocations**

Where consistent with local comprehensive plans and Oregon's statewide planning goals and rules, BLM-administered lands will continue to be available for needed rights-of-way. Utility/transportation routes (for electric transmission, as distinguished from electricity distribution or facilities; pipelines 10 inches in diameter or larger; significant canals, ditches and conduits; railroads; communication lines for interstate use; federal and state highways; and major county roads) will be confined to existing and other previously designated corridors, which are shown on Map 2-12. Communication facilities will be allowed on existing communication sites, also shown on Map 2-12.

Corridor widths vary depending on the number of parallel facilities within the corridor, but are a minimum of 2,000 feet (1,000 feet on either side of existing center lines) unless restricted by exclusion areas described in the following paragraph. Applicants will be encouraged to locate new facilities (including communication sites) adjacent to existing facilities to the extent technically and economically feasible. New facilities will be limited to the minimum acreage necessary for operation and maintenance.

All research natural areas, visual resource management Class I areas (see the Visual Resources section), and the Mountain Lakes Wilderness Study Area will be considered right-of-way exclusion areas (where future rights-of-way will be granted only when mandated by law).



## Chapter 2 - Description of the Alternatives

With the exception of buried lines in rights-of-way of existing roads, avoid locating rights-of-way in the areas listed in Table 2-11.

Future rights-of-way may be granted in avoidance areas when no feasible alternative route or designated right-of-way corridor is available.

### Management Actions/Direction

#### *Riparian Reserves*

Issue rights-of-way to avoid adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where legally possible, adjust existing rights-of-way to eliminate adverse effects that retard or prevent the attainment of Aquatic Conservation Strategy objectives. If adjustments are not effective and where legally possible, eliminate the activity. Priority for modifying existing rights-of-way will be based on the actual or potential impact and the ecological value of the riparian-wetland resources affected.

For proposed hydroelectric projects under the jurisdiction of the Federal Energy Regulatory Commission, provide timely, written comments regarding maintenance of instream flows and habitat conditions and maintenance/restoration of riparian resources and stream channel integrity. Request the Federal Energy Regulatory Commission to locate proposed support facilities outside of Riparian Reserves. For existing support facilities inside Riparian Reserves that are essential to proper management, provide recommendations to the Federal Energy Regulatory Commission that ensure Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, provide recommendations to the Federal Energy Regulatory Commission that such

support facilities should be relocated. Existing support facilities that must be located in the Riparian Reserves should be located, operated, and maintained with an emphasis to eliminate adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Neither accept nor deny the application for a right-of-way to construct the Salt Caves hydroelectric project until the Congress or the Secretary of the Interior (under Section 2a(1) of the National Wild and Scenic Rivers Act) acts on the suitability of segment 2 of the upper Klamath River for designations as scenic under the National Wild and Scenic Rivers Act. Currently the upper Klamath River is under consideration by the Secretary of the Interior for designation under the National Wild and Scenic Rivers Act.

For other hydroelectric and surface water development proposals in Tier 1 Key Watersheds, require instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. For other hydroelectric and surface water development proposals in all other watersheds, give priority emphasis to instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies.

#### *Late-Successional/District Designated Reserves*

Retain and maintain existing developments, such as utility corridors and electronic sites, consistent with other management actions/direction for Late-Successional/District Designated Reserves.

Table 2-11. Right-of-Way Avoidance Areas.

Avoidance Area	Acres
Recreation Sites (existing and proposed)	700
Areas of Critical Environmental Concern (except research natural areas)	7,680
Scenic and Recreational Rivers (suitable)	4,660
Sensitive Species Habitat	4,000
Visual Resource Management Class II Areas	33,500
Late-Successional/District Designated Reserves	1,600
Late-Successional/District Designated Reserve Buffers	3,900

Neither construct nor authorize new facilities that may adversely affect Late-Successional/District Designated Reserves.

Review on a case-by-case basis new development proposals. They may be approved when adverse effects can be minimized and mitigated.

Locate new developments to avoid degradation of habitat and adverse effects on identified late-successional species.

Remove hazard trees along utility rights-of-way and in other developed areas.

### **Other Land Use Allocations**

Encourage location of major new rights-of-way projects in existing utility/transportation routes and other previously designated corridors.

Encourage applicants to consult the Western Regional Corridor Study in planning route locations.

Consider new locations for rights-of-way projects on a case-by-case basis. Applications may be approved where the applicant can demonstrate that use of an existing route or corridor will not be technically or economically feasible; and the proposed project will otherwise be consistent with this proposed resource management plan and will minimize damage to the environment.

Allow expansion of communications facilities on existing communication sites.

Consider new communication sites on a case-by-case basis. Applications may be approved where the applicant can demonstrate that use of an existing, developed communication site will not be technically feasible; and the proposed facility will otherwise be consistent with this proposed resource management plan and will minimize damage to the environment.

**Alternative Energy Projects.** Issuance of a right-of-way grant for alternative energy (pumped storage, wind, etc.) will be acceptable under this alternative so long as the proposal is consistent with other resource values and management objectives. Consistency will be determined by appropriate site-specific National Environmental Policy Act analysis.

## **Access**

### **Objectives**

Acquire access to public lands to assist various programs to meet management objectives.

### **Land Use Allocations**

None

### **Management Actions/Direction**

Acquire access to Zone 1 and large blocks of Zone 2 lands when appropriate to manage the resources found there, by obtaining easements, entering into new reciprocal right-of-way agreements, or amending existing reciprocal right-of-way agreements. Condemnation for access will be pursued when necessary.

Acquire perpetual exclusive easements whenever possible to provide for public access and BLM control. Acquire nonexclusive easements, which do not provide for public access, consistent with management objectives and where no public access is needed. Acquire temporary easements only when other options are not available.

Continue to obtain access across lands of private companies or individuals who are a party (permittee) to existing reciprocal rights-of-way agreements through appropriate agreements. Whenever a willing permittee is identified and it is determined there is a need for public access, negotiations could be started to provide for the acquisition of public access rights.

Emphasize acquisition for public access on major travel routes.

## **Withdrawals**

### **Objectives**

Protect lands with important resource values and/or significant levels of investment by withdrawing them from the operation of public land and mineral laws. Withdrawal is necessary to avoid irreparable damage that may be caused by nondiscretionary activities.



## Land Use Allocations

Tables 2-12, 2-13, and 2-14 show recommendations for communication sites, withdrawals, and management direction for land returning to BLM-administration.

Bureau of Land Management-proposed withdrawals are as follows:

1. T. 39S. R. 9E., Sec. 21, lots 15, 17, and 18 Klamath Falls administrative site - 10.04 acres. Transfer jurisdiction of an existing Fish and Wildlife Service Administrative site withdrawal to the BLM. Withdrawal is needed to protect improvements (tree seedling cooler) placed upon public land.
2. T. 38N. R. 5E., Sec. 19 lots 3 and 4, S $\frac{1}{2}$ S $\frac{1}{2}$ N $\frac{1}{2}$ E $\frac{1}{2}$ SW $\frac{1}{4}$ , SE $\frac{1}{4}$ SW $\frac{1}{4}$ , SW $\frac{1}{4}$ N $\frac{1}{2}$ E $\frac{1}{2}$ SE $\frac{1}{4}$ , E $\frac{1}{2}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ , SW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ , S $\frac{1}{2}$ SE $\frac{1}{4}$ ; Sec. 29 W $\frac{1}{2}$ W $\frac{1}{2}$ W $\frac{1}{2}$ NW $\frac{1}{4}$ ; Sec. 30 lots 1, and 2, N $\frac{1}{2}$ NE $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ , SE $\frac{1}{4}$ NE $\frac{1}{4}$ , N $\frac{1}{2}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ . Old Baldy Research Natural Area - 581.20 acres located within the above described public land. A new withdrawal is proposed to protect the proposed Old Baldy Research Natural Area.

**Management of Newly Acquired Lands.** Lands may come under BLM administration after completion of the Record of Decision for this Resource Management Plan/Environmental Impact Statement through exchange, donation, purchase, revocation of withdrawals of other Federal agencies, or relinquishment of Recreation and Public Purpose Act leases. Newly acquired or administered lands will be managed for their highest potential or for the purposes for which they are acquired. For example, lands acquired within "special management areas" with Congressional or Resource Management Plan allocation/direction will be managed in conformance with guidelines for those areas. If lands with unique or fragile resource values are acquired, it may be appropriate to protect those values until the next plan revision.

Lands acquired with no identified special values or management goals will be managed in the same manner as surrounding or comparable BLM-administered lands. This implies typical timber harvest opportunities, grazing management practices, management of the mineral estate, standard operating procedures and precommitted mitigation measures.

## Management Actions/Direction

Complete the review of existing withdrawals to determine whether continuation of the withdrawal is

consistent with the statutory objectives of the programs for which the lands were dedicated and with other important programs.

Terminate unnecessary or duplicative withdrawals and continue those which still meet the intent of the withdrawal.

Implement the BLM-proposed withdrawals listed under land use allocations. This will involve recommendations to and approval by the Secretary of the Interior.

Evaluate future withdrawal proposals for compliance with program objectives and federal law and recommend appropriate action to the Secretary of the Interior.

Limit withdrawals to the minimum area needed and restrict only those activities that will be detrimental to the purposes of the withdrawal.

## Roads

### Objectives

Develop and maintain a transportation system that serves the needs of users in an environmentally sound manner. Arterial and major collector roads will form the backbone of the transportation system in the planning area.

Correct problems associated with high road density by emphasizing the reduction of minor collector and local road densities where those problems exist.

Manage roads to meet the needs identified under other resource programs (for example, seasonal road closures for wildlife). Road management is mentioned or implied primarily under Aquatic Conservation Strategy Objectives, Riparian Reserves, Late-Successional/District Designated Reserves, Water Quality and Soils, Wildlife, Fish Habitat, Special Status and Supplemental Environmental Impact Statement Special Attention Species Habitat, Timber Resources, and Recreation Sections.

In accordance with other management activities, road system management will have a goal of reducing open road density to 1.5 miles or less per section.

## Land Use Allocations

There are approximately 6,900 acres (950 miles) of roads on BLM-administered land in the Klamath Falls Resource Area.

**Table 2-12. Communication Sites.**

Site	No. of BLM Authorized Users	Site Type	BLM Restrictions
Hamaker Mountain	13	Radar, Microwave, two-way radio	Must be compatible with existing user frequencies. Must be Department of Defense and Federal Aviation Administration (FAA) compatible.
Stukel Mountain	2	TV broadcasting, two-way radio	Must be compatible with existing user frequencies Must be FAA and low poer radio compatible.
Yainax Butte	2	Low power government radio only	Solar power only
Brady Butte	1	Microwave	Must be microwave compatible
Buck Butte	3	Microwave	Must be microwave compatible
Malin	1	Passive microwave reflector	Must be microwave reflector compatible
Bly	1	Passive microwave reflector	Must be microwave reflector compatible

Table 2-14. Management Direction For Land Returning To BLM Administration.

Authority	Acres	Termination/Revocation Recommendation and Rationale	PRMP
BLM Order 6/14/57 ANS 57	160.00	Modify withdrawal, 80 acres continued, 80 acres returned to BLM, not all land used by withdrawing agent.	Mountain top will not be used for a communication site. Use would be the same as adjacent BLM land.
PLO 3869	254.35	Continue withdrawal. BLM's investment still in need of protection.	Gerber Reservoir, Surveyor Mountain, and Topsy recreation site and campground will continue to be used for the life of the plan.
PLO 3274	10.04	Modify withdrawal. Half of property to be transferred to BLM for administrative site use.	Use as an administrative site. Will continue for the life of the plan. More buildings to be constructed.
SO of 7/9/1904	3,585.82	Gerber Reservoir and adjacent lands. Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration. Right-of-way issued protecting Bureau of Reclamation (BR) use.	Lands would be managed to produce a sustained yield of forage for wildlife consistent with other uses and values. Refer to the livestock grazing Appendix L for the Proposed Resource Management Plan for allotments 803, 862, 864, and 885.
SO of 7/27/1904	2,878.87	Miller Creek and associated canyon. Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration. Right-of-way issued protecting BR use.	Miller Creek and its associated canyon would be designated as an area of critical environmental concern and managed to protect the resources found there.
SO of 1/20/1910	1,196.09	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration.	Dispose of the land to the Winema National Forest in exchange for other Forest Service lands.
SO of 7/31/1919	80.00	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Right-of-way issued to protect BR interests. Suitable for return to BLM administration.	Lands would be managed to produce a sustained yield of forage for livestock and wildlife consistent with other uses and values. Refer to livestock grazing Appendix L for the Proposed Resource Management Plan for allotment 851.
SO of 2/25/1939	120.00	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration.	Dispose of the land by sale or exchange according to the Land Ownership Adjustment Criteria in Appendix M, subject to site specific National Environmental Policy Act analysis.
SO of 4/21/1940	41.04	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration.	Dispose of the land by sale or exchange according to the Land Ownership Adjustment Criteria in Appendix M, subject to site specific National Environmental Policy Act analysis.
SO of 2/11/1947	60.06	Modify withdrawal. Continue withdrawal on 28.06 acres and revoke the withdrawal on 22 acres as directed by holding agency. Property no longer needed for project purposes. Rights-of-way issued to protect BR interests. Lands suitable for return to BLM administration.	Dispose of the land by sale or exchange according to the Land Ownership Adjustment Criteria in Appendix M, subject to site specific National Environmental Policy Act analysis.

## **Management Actions/Direction**

### **All Land Use Allocations**

Prepare a district wide road management plan after approval of the resource management plan. The management plan will specifically address recreation use, road densities, road closures, wildlife protection, water quality, timber management, construction and maintenance standards, fire suppression, and coordination with adjacent landowners. Address road management planning on a watershed basis consistent with Late-Successional Reserves, Riparian Reserves, and other major allocations. Specific road closures will be determined using standard analysis, public involvement, and notification procedures.

Existing off-highway vehicle closures in big game winter ranges will remain in effect throughout the plan (see the Recreation section for more details). Other important and sensitive wildlife habitats (special habitat features, project areas) will be evaluated for seasonal road closures. Some roads could remain open for administrative use, forest product removal, or access for mineral exploration and development. Road closures could be achieved using a variety of methods, such as gates, cables, boulders, obliteration, or other.

Determine standards for new road construction during the project planning process. Standards will be the minimum necessary to meet resource and allocation objectives (for example, recreation site, timber sale, key watershed, etc.) while having minimal impacts on the environment.

Minimize new road construction in areas with fragile soils to reduce impacts to soils, water quality, and fisheries. Stabilize existing roads where they contribute to significant adverse effects on these resources.

Locate, design, construct, and maintain roads to standards that meet management objectives in accordance with the district road management plan.

Follow best management practices (see Appendix F) for water quality and soil productivity to mitigate adverse effects on soils, water quality, fish, and riparian-wetland habitat during road construction and maintenance.

Reduce road density by closing minor collector and local roads in areas or watersheds where water quality degradation, big game harassment, or other road related resource problems have been identified.

Acquire water rights for road management purposes consistent with Oregon State Water laws.

Specifically address, either in the road management plan or in a watershed analysis, stabilizing existing roads located in drainages, watersheds with water quality limited streams, and other parts of the resource area where soil/water quality problems are known to exist.

Avoid road construction in special areas and special habitats.

Manage nonthrough roads classified as local and located within rural interface areas and within one-quarter mile of existing dwellings to limit unauthorized public use activity that could contribute to public safety hazards, increased fire risk, and vandalism to private property. Gates and other types of traffic barriers such as guardrails, berms, ditches, and log barricades will be used as appropriate.

Reduce the further spread of blackstain fungus through proper timing of roadside brushing.

### **Riparian Reserves**

Cooperate with federal, state, and county agencies and work with parties with road use agreements to achieve consistency in road design, operation, and maintenance necessary to attain Aquatic Conservation Strategy objectives.

For each existing or planned road, meet Aquatic Conservation Strategy objectives by:

- ◆ Completing watershed analyses, including appropriate geotechnical analyses (for example, examining soil and rock conditions in riparian and stream crossings) prior to construction of new roads or landings in Riparian Reserves;
- ◆ Minimizing road and landing locations in Riparian Reserves;
- ◆ Preparing road design criteria, elements, and standards that govern construction and reconstruction;
- ◆ Preparing operation and maintenance criteria that govern road operation, maintenance, and management;
- ◆ Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow;
- ◆ Restricting sidecasting as necessary to prevent the introduction of sediment to streams; and
- ◆ Avoiding wetlands entirely when constructing new roads.

## **Chapter 2 - Description of the Alternatives**

Determine the influence of each road on the Aquatic Conservation Strategy objectives through watershed analysis. Meet Aquatic Conservation Strategy objectives by:

- ◆ Reconstructing roads and associated drainage features that pose a substantial risk;
- ◆ Prioritizing reconstruction based on current and potential impact to riparian-wetland resources and the ecological value of the riparian-wetland resources affected; and
- ◆ Closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs.

Design and construct new culverts, bridges and other stream crossings and improve existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions. New structures and improvements will be designed to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

Minimize sediment delivery to streams from roads. Outslipping of the roadway surface is preferred, except in cases where outslipping will increase sediment delivery to streams or where outslipping is infeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.

Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

Develop and implement a Road Management Plan or a Transportation Management Plan that meets the Aquatic Conservation Strategy objectives. As a minimum, this plan will include provisions for the following activities:

- ◆ Inspections and maintenance during storm events;
- ◆ Inspections and maintenance after storm events;
- ◆ Road operation and maintenance giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources;
- ◆ Traffic regulation during wet periods to prevent damage to riparian resources; and

- ◆ Establishing the purpose of each road by developing the transportation management objective.

### **Late-Successional/District Designated Reserves**

Construct roads in Late-Successional/District Designated Reserves if the potential benefits of silviculture, salvage, and other activities exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they will be kept to a minimum, routed through unsuitable habitat where possible, and designed to minimize adverse impacts. Alternative access, such as aerial logging, should be considered to provide access for activities in reserves.

Remove trees along rights-of-way if they are a hazard to public safety. Consider leaving material on site if available coarse woody debris is inadequate. Consider topping of trees as an alternative to felling.

### **Key Watersheds**

Reduce existing road mileage within key watersheds. If funding is insufficient to implement reductions, neither construct nor authorize through discretionary permits a net increase in road mileage in Key Watersheds.

### **Noxious Weeds**

#### **Objectives**

Avoid introducing or spreading noxious weed infestations in any areas.

Contain and/or reduce noxious weed infestations on BLM-administered land using an integrated pest management approach. Some noxious weeds expected to be subject to control are listed in Table 2-15.

#### **Land Use Allocations**

No allocations are made for noxious weeds in the planning process.

### **Management Actions/Direction**

#### **All Land Use Allocations**

Continue to survey BLM-administered land for noxious weed infestations, report infestations to the Oregon Department of Agriculture, and work with the Department of Agriculture to reduce infestations.



Use control methods which do not retard or prevent attainment of Aquatic Conservation Strategy Objectives.

Apply integrated pest management methods (for example, chemical, mechanical, manual, and/or biological) in accordance with the BLM's multi-state environmental impact statement, Northwest Area Noxious Weed Control Program, 1985, as supplemented in 1987, and the related Record of Decision, and as described in the *Noxious Weed Strategy for Oregon/Washington* (July 1994). Local direction for the planning area is from an integrated weed control plan and environmental assessment decision record of July 1993.

Design management actions to minimize the potential for noxious weed invasion and/or dominance of the affected area.

### **Late-Successional/District Designated Reserves**

Evaluate impacts of non-native plants (weeds) growing in Late-Successional/District Designated Reserves.

Develop plans and recommendations for eliminating or controlling non-native plants (weeds) which adversely affect Late-Successional/District Designated Reserve objectives. Include an analysis of effects of implementing such programs on other species or habitats within reserves.

## **Hazardous Material**

### **Objectives**

Minimize use of hazardous materials and eliminate known hazardous waste.

### **Land Use Allocations**

No allocations are made for hazardous material sites in the planning process.

**Table 2-15. Noxious Weed Species Subject to Control in Klamath County.**

Botanical Plant Name	Common Plant Name	Priority <sup>1</sup>
<i>Carduus nutans</i>	Musk thistle	3
<i>Centaurea diffusa</i>	Diffuse knapweed	3
<i>Centaurea maculosa</i>	Spotted knapweed	3
<i>Centaurea repens</i>	Russian knapweed	3
<i>Centaurea solstitialis</i>	Yellow starthistle	3
<i>Centaurea virgata</i> ssp. <i>squarosa</i>	Squarrose knapweed	2
<i>Chondrilla juncea</i>	Rush skeletonweed	3
<i>Cirsium arvense</i>	Canada thistle	3
<i>Conium maculatum</i>	Poison hemlock	3
<i>Euphorbia esula</i>	Leafy spurge	3
<i>Hypericum perforatum</i>	St. Johnswort	3
<i>Linaria dalmatica</i>	Dalmation toad flax	3
<i>Onopordum acanthium</i>	Scotch thistle	3
<i>Salvia aethiopsis</i>	Mediterranean sage	2
<i>Senecio jacobaea</i>	Tansy ragwort	3
<i>Tribulus terrestris</i>	Puncture vine	3
<i>Xanthium spinosum</i>	Spiny clotbur	2

<sup>1</sup> Priority 3 species are established species by containment of existing populations and treatment of small outlying populations prevented. Priority 2 species are new invader species that may be controlled through appropriate, prompt action including multi-year follow-up action.



## **Management Actions/Direction**

Identify, investigate, and arrange for removal of hazardous substances on BLM-administered land in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act. Emergency response will be as specified in the District Hazardous Materials Contingency Plan. The response will include cleanup, proper notifications, criminal investigations, risk assessment, and other actions consistent with the Act and the nature of the emergency.

Store, treat and dispose of hazardous materials in accordance with the Resource Conservation and Recovery Act and other appropriate regulations.

Use the Emergency Planning and Community Right-To-Know Act to coordinate emergency planning with state and local jurisdictions concerning hazardous materials, emergency notifications, and routine reporting of hazardous materials inventories.

Until hazardous materials on BLM-administered land are removed, protect employees and the public from exposure to these materials.

Provide information to the public regarding the need to properly dispose of hazardous materials and the danger of becoming exposed to hazardous materials.

## **Fire/Fuels Management**

### **Objectives**

Provide appropriate fire suppression responses to wildfires that will help meet resource management objectives and minimize the risk of large-scale, high intensity wildfires.

Use prescribed fire to meet resource management objectives. This will include but not be limited to fuels management for wildfire hazard reduction, restoration of desired vegetation conditions, management of habitat, management of fire dependent/adapted species, and silvicultural treatments.

Adhere to smoke management/air quality standards of the Clean Air Act and State Implementation Plan for prescribed burning.

### **Land Use Allocations**

None specifically for fire/fuels management.

## **Management Actions/Direction**

### **General**

Apply the management actions/direction in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section.

Address fire/fuels management for all land use allocations as part of watershed analysis and project planning. This will include determinations of the role of fire and the risk of large-scale, high intensity wildfires at the landscape level.

Describe the need to use prescribed fire or other fuel management treatments to reduce fuel hazards and the risk of large-scale, high intensity fire, while maintaining coarse woody debris, down logs, green tree retention, and snags, consistent with the natural role of fire and protection standards for each land allocation unit.

Coordinate fire management activities in rural interface areas with local governments, agencies, and landowners. During watershed analysis, identify additional factors which may affect hazard reduction goals. Minimize the impacts of wildfire suppression actions.

Following election by the interdisciplinary team, prescribed burning will be conducted using management ignition to reduce wildfire hazards in locations adjacent to rural interface areas.

The management of wildland fire will be conducted following the processes and guidelines within the Klamath Falls Resource Area Fire Management Environmental Assessment (Environmental Assessment OR-014-94-09, Finding of No Significant Impacts, May 1994 and Record of Decision, June 1994. The Fire Environmental Assessment assessed/assesses the impacts of wildfire as a historic natural process, current wildfire suppression methods, and how prescribed fire mimicking a natural function, is to be conducted on areas selected by random process for ecosystem management, utilizing both management ignition and/or prescribed natural fire (see Table 2-1).

### **All Land Use Allocations**

#### **Wildfire Suppression**

Minimize the direct negative impacts of wildfire suppression on ecosystem management objectives.

Respond to all wildfires by taking appropriate suppression actions. In most cases, responses will consist of aggressive initial attack to extinguish fires at the smallest size possible.

For wildfires that escape initial attack, perform a Wildfire Situation Analysis to develop a suppression strategy to evaluate the damage induced by suppression activities compared to expected wildfire damage. Suppression tactics will consider:

- ◆ public and firefighting personnel safety;
- ◆ protection of specific attributes of each land use allocation;
- ◆ coordination of wildfire suppression activities to avoid causing adverse impacts on federal and nonfederal lands;
- ◆ appropriate use of suppression tools such as aircraft, dozers, pumps and other mechanized equipment, and clear definitions of any restrictions relating to their use;
- ◆ the potential adverse affects on meeting ecosystem management objectives; and
- ◆ protection of structural components such as snags, duff, and coarse woody debris to the extent possible.

#### **Fuels Management (including Hazard Reduction) Using Prescribed Fire**

Modify fuel profiles in order to lower the potential of fire ignition and rate of spread; protect and support land use allocation objectives by lowering the risk of high intensity, stand-replacing wildfires; and, adhere to smoke management and air quality standards.

Reduce hazards through methods such as prescribed burning, mechanical or manual manipulation of forest vegetation and debris, removal of forest vegetation and debris, and combinations of these methods. Hazard reduction plans will be developed through an interdisciplinary team approach and will consider the following:

- ◆ safety of fire fighting personnel;
- ◆ identification of levels of coarse woody debris and snags of adequate size and in sufficient quantities to meet habitat requirements of species of concern;
- ◆ consumption of litter and coarse woody debris that are in excess of historic fuel levels that existed prior to attempted fire suppression;
- ◆ developing a fuel profile that supports land allocation objectives; and seeking a balance between reducing the risk of wildfire and the cost efficiency consistent with meeting land allocation objectives;

- ◆ interagency cooperation to assure cost effective fuel hazard reduction across the landscape;
- ◆ adherence to smoke management and air quality standards;
- ◆ consistency with objectives for land use allocations;
- ◆ maintenance or restoration of ecosystem processes or structure; and
- ◆ the natural role of fire in specific landscapes, current ecosystem needs, and wildfire hazard analysis included in the fire management plan.

#### **Prescribed Fire Use for Ecosystem Maintenance and Restoration**

The use of prescribed fire will be based on the risk of high intensity wildfire and the associated cost and environmental impacts of using prescribed underburning to meet protection, restoration, and maintenance of critical stands that are current susceptible to large-scale catastrophic wildfire.

Introduce prescribed fire across large areas over a period of time to create a mosaic of vegetation conditions. Treatments should be site-specific treatments because some species with limited distributions are fire intolerant. The use prescribed burning will be based on an interdisciplinary evaluation. Funding authority, therefore, must reflect the range of objectives identified for using fire under ecosystem management.

Use prescribed fire to manage seral stage diversity through the development of fire resistant vegetation mosaics by timing the application of fire (for example, every five to ten years).

#### **Riparian Reserves**

Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies will recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management activities could be damaging to long-term ecosystem function.

Locate incident bases, camps, helibases, staging areas, helispots and other centers for incident activities outside of Riparian Reserves. If the only suitable location for such activities is within the Riparian Reserve, an exemption may be granted following a review and recommendation by a resource advisor. The advisor will prescribe the location, use conditions, and rehabilitation requirements. Use an

## **Chapter 2 - Description of the Alternatives**

interdisciplinary team to pre-determine suitable incident base and helibase locations.

Minimize delivery of chemical retardant, foam, or other additives to surface waters. An exception may be warranted in situations where over-riding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor, when an escape would cause more long-term damage.

Design prescribed burn projects and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.

Establish an emergency team to develop a rehabilitation treatment plan needed to attain Aquatic Conservation Strategy objectives whenever Riparian Reserves are significantly damaged by a wildfire or a prescribed fire burning outside prescribed parameters.

Limit the size of all wildfires to the extent practicable.

Allow some natural fires to burn under prescribed conditions. This decision will be based on additional analysis and planning. In Riparian Reserves, the goal of wildfire suppression is to limit the size of all fires. When watershed and/or landscape analysis, or province-level plans are completed and approved, some natural fires may be allowed to burn under prescribed conditions.

Consider rapidly extinguishing smoldering coarse woody debris and duff to preserve these ecosystem elements.

Locate and manage water drafting sites (for example, sites where water is pumped to control or suppress fires) to minimize adverse effects on riparian-wetland habitat and water quality as consistent with Aquatic Conservation Strategy objectives.

### ***Late-Successional/District Designated Reserves***

Emphasize maintaining late-successional habitat in wildfire suppression plans.

Use minimum impact suppression methods for fuels management in accordance with guidelines for reducing risks of large-scale disturbances.

During fire suppression activities, consult with an interdisciplinary team to assure that habitat damage is minimized.

Until a fire management plan is completed for a Late-Successional/District Designated Reserve or group of reserves, suppress wildfire to avoid loss of habitat and to maintain future management options. Then

some natural fires may be allowed to burn under prescribed conditions.

Prepare a specific fire management plan prior to any habitat manipulation activities in Late-Successional Reserves. Specify how hazard reduction and other prescribed fire applications meet the objectives of the Late-Successional/District Designated Reserve. Until the plan is approved, proposed activities will be subject to review by the Regional Ecosystem Office.

Apply prescribed fire in a manner which retains the amount of coarse woody debris determined through watershed analysis.

Consider rapidly extinguishing smoldering coarse woody debris and duff.

### ***Matrix (General Forest Management Area) - West and East Sides***

Plan and implement prescribed fire treatments to minimize:

- ♦ Intensive burning, unless appropriate for certain specific habitats, communities, or stand conditions;
- ♦ consumption of litter and coarse woody debris that are in excess of historic fuel levels that existed prior to attempted fire suppression; and
- ♦ disturbance of soil and litter that may occur as a result of heavy equipment operation.

Identify levels of coarse woody debris and snags of adequate size and in sufficient quantities to meet habitat requirements of species of concern.

# **Table 2-1 and Table 2-13**

Table 2-1. Comparisons of Allocations and Management by Alternative.<sup>1</sup>

	PRMP	DRMP Preferred	No Action
Establishment of riparian management areas (average width in feet on each side of stream) <sup>2</sup>			
Stream Order: 1	N/A	75 <sup>4</sup>	See footnote 3
2	N/A	75 <sup>4</sup>	See footnote 3
3	N/A	105 <sup>4</sup>	See footnote 3
4	N/A	150	See footnote 3
5	N/A	210	See footnote 3
6+	N/A	240	See footnote 3
Lakes, ponds, and other waters	N/A	150	See footnote 3
Riparian Reserves (width in feet on each side of stream)			
Fish bearing streams	300	N/A	N/A
Lakes and natural ponds	300	N/A	N/A
Permanently flowing non-fish-bearing streams	150	N/A	N/A
Constructed ponds and reservoirs, and wetlands greater than one acre	150	N/A	N/A
Seasonally flowing or intermittent streams	100	N/A	N/A
Protected acres in RMAs - west side	N/A	2,452	See footnote 3
Protected acres in Riparian Reserves - west	19,450	N/A	N/A
Protected acres in RMAs - east side	N/A	1,517	See footnote 3
Protected acres in Riparian Reserves - east	9,100	N/A	N/A
Water quality protection	Restore and maintain the ecological health of watersheds & aquatic ecosystems contained within them on public lands through implementation of the Aquatic Conservation Strategy. The components of the Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration.	Provide substantial protection for wetlands including trout habitat, along selected streams, and other water environments.	Implement riparian requirements and enhancement projects.

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
75	See footnote 5	See footnote 6	60	50
75	75	105	140	60
75	100	150	200	200
75	140	210	280	280
75	160	240	320	320
75	100	150	200	400
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
1,280	1,747	2,452	4,136	5,409
N/A	N/A	N/A	N/A	N/A
1,019	1,224	1,797	2,949	2,233
N/A	N/A	N/A	N/A	N/A
Meet legal requirements for protection of wetlands and water quality to protect trout habitat and other relevant values.	Meet legal requirements for protection of wetlands and water quality with moderate additional protection for trout habitat, other substantial streams, and other water environments.	Provide substantial protection for wetlands and riparian habitats, including trout habitat, along selected streams, and other water environments.	Provide substantial protection for wetlands and riparian zones along most streams and other water environments.	Manage all riparian zones and wetlands to maintain and improve water quality through protection of riparian native plant communities. Protect or enhance riparian zones to achieve a healthy and productive ecological condition for maximum long-term benefits and values.



Table 2-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
Livestock forage utilization	<p>Restore or maintain riparian-wetland areas so that 75 percent or more are in proper functioning condition by 1997. The overall objective is to achieve an advanced ecological status, except where resource management objectives, including proper functioning condition, will require an earlier successional stage, thus providing the widest variety of vegetation and habitat diversity for wildlife, fish, and watershed protection. Provide livestock forage consistent with the above.</p>	<p>Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient vegetation at the time of grazing for maintenance of plant vigor and streambank protection. Set specific utilization levels within selected riparian habitats that allow for the production of a moderate sustained yield of forage. Fence the following riparian areas to manage livestock use: Fall Creek, Tunnel Creek, and the unfenced portions of Long Prairie Creek and Hayden Creek.</p>	<p>Manage selected riparian habitats to enhance their vegetative characteristics through either fencing to control livestock use or by excluding livestock to allow vegetative recovery. Fence small riparian areas, such as springs and seeps when developed and provide stock water outside for livestock.</p>

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
<p>Manage forage utilization by livestock in riparian zones to meet minimum water quality standards while maximizing forage production.</p>	<p>Manage forage utilization by livestock in riparian zones to meet minimum water quality standards while maximizing forage production consistent with other uses and values.</p>	<p>Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient maintenance of plant vigor and streambank protection. Set specific utilization levels within selected riparian habitats, that allow for the production of a moderate sustained yield of forage.</p>	<p>Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient maintenance of plant vigor and bank protection. Protect most riparian ecosystems through the use of intensive grazing management or by excluding livestock from those areas. Exclude Fall Creek and Tunnel Creek from livestock use.</p>	<p>Livestock grazing management practices will provide for regrowth of riparian plants after use or will leave sufficient maintenance of plant vigor and streambank protection. Protect all riparian ecosystems either through the use of intensive grazing management or by excluding livestock. Exclude Fall Creek, Tunnel Creek, the class 3 stream in the Johnson Prairie Allotment, and Long Lake from livestock use.</p>

Table 2-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Old Growth and Mature Habitat</b>			
<b>West Side</b>			
Existing old growth (acres) excluded from timber harvest	4,526	1,235	135
Existing mature stands (acres) excluded from timber harvest	4,090	3,699	212
Total forest land (acres) excluded from planned timber harvest	17,837	11,016	9,790
Existing old growth (acres) managed for partial retention	143	2,238	0
Existing mature stands (acres) managed for partial retention	154	1,298	32
Total forest land managed for partial retention	1,257	5,691	2,560
<b>East Side<sup>7</sup></b>			
Existing old growth (acres) excluded from timber harvest	729	144	22
Existing mature stands (acres) excluded from timber harvest	1,420	401	64
Total forest land (acres) excluded from planned timber harvest	6,561	1,458	166
Existing old growth (acres) managed for partial retention	67	79	160
Existing mature stands (acres) managed for partial retention	380	566	576
Total forest land managed for partial retention	1,292	1,866	3,071

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
322	1,583	3,083	2,015	5,628
2,048	3,644	4,373	4,048	10,529
6,281	9,854	15,821	13,433	44,872
0	7	355	375	3
0	77	206	270	12
0	135	1,764	2,353	2,695
42	326	513	150	1,604
58	415	800	716	3,006
199	1,408	2,779	1,436	15,946
0	0	121	236	0
0	0	754	958	0
0	52	2,585	3,619	0

Table 2-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Timber</b>			
<b>West Side</b>			
Forest management allocations (acres)			
Intensive	0	0	37,160
Restricted	23,563	36,634	2,560
Woodlands	0	0	0
Enhancement of other uses or not available (total)	24,059	11,016	9,790
Practices (assumed average annual acres for the first decade):			
Regeneration harvest unit (acres) <sup>a</sup>	131	127	1,610
(TRIM-PLUS harvest acres) <sup>a</sup>	(61)	(59)	See footnote 9
Commercial thinning/density management /uneven-age harvest units (acres) <sup>a</sup>	828	723	290
(TRIM-PLUS harvest acres) <sup>a</sup>	(385)	(336)	See footnote 9
Site preparation (pile & burn slash)	180	180	303
Vegetation control	200	250	189
Animal damage control	400	500	148
Pre-commercial thinning	50	50	220
Brushfield/hardwood conversion	0	30	0
Planting/regular stock	300	300	1,005
Planting/genetically selected stock	100	100	200
Fertilization	32	32	639
New road construction (miles/acres)	1/11	0.8/9	1.6/17
Pruning	16	16	0
PSQ sale quantity (mmbf)	5.91 <sup>10</sup>	4.5	19.0
PSQ sale quantity (mmcf)	1.03 <sup>10</sup>	.779	3.423

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
41,199	37,474	0	0	573
0	134	31,829	34,217	2,205
170	88	0	0	0
6,281	9,954	15,821	13,433	44,872
927	885	56	1,003	77
(547)	(461)	(31)	(444)	(35)
163	155	424	177	13
(96)	(81)	(238)	(78)	(6)
300	240	120	210	24
346	300	200	280	200
800	750	500	600	500
58	50	20	40	10
40	35	20	35	0
529	529	160	300	40
100	100	40	100	10
40	34	31	31	1
1.0/11	1.2/13	0.65/7	1.3/14	0.02/.2
18	16	11	11	0
13.8	11.8	4.5	9.6	1.0
2.483	2.103	0.791	1.674	.182



Table 2-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Timber</b>			
<b>East Side</b>			
Forest management allocations			
(acres)			
Intensive	0	0	17,674
Restricted	8,766	14,751	3,071
Woodlands	0	0	0
Enhancement of other uses			
or not available (total) <sup>11</sup>	82,464	60,984	54,990
Practices (assumed average annual			
acres for the first decade):			
Regeneration harvest units (acres) <sup>11</sup>	33	64	60
Commercial thinning/density			
management uneven age			
harvest units (acres)	269	516	540
Site preparation (pile & burn slash)	70	120	203
Vegetation control	25	28	0
Animal damage control	15	17	0
Pre-commercial thinning	20	17	50
Brushfield/hardwood conversion	0	22	0
Planting/regular stock	60	125	116
Planting/genetically selected			
stock	15	28	30
Fertilization	0	0	0
New road construction (miles/acres)	0.7/8	1.4/15	1.6/17
Pruning	13	13	0
PSQ sale quantity (mmbf)	0.40 <sup>10</sup>	1.29	1.40
PSQ sale quantity (mmcf)	0.08 <sup>10</sup>	0.248	0.270

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
15,978	14,717	0	0	0
0	52	13,398	14,741	231
3,959	3,959	0	0	0
55,798	60,966	62,337	60,994	75,504
60	58	53	58	1
564	524	474	522	8
200	160	80	140	16
33	25	25	25	0
25	20	15	20	15
20	15	15	15	0
40	20	20	30	0
105	116	2	110	
31	29	26	29	0
0	0	0	0	0
1.6/17	1.2/13	1.4/15	1.5/16	0.1/1
15	15	12	12	0
1.38	1.29	1.17	1.28	0.021
0.267	0.249	0.226	.248	0.004

Table 2-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Special Status (including Threatened and Endangered) Species and SEIS Special Attention Species Habitat (Animals and Plants)</b>			
Conservation standards in addition to those common to all the alternatives.	Manage habitats of federal candidate state listed, state candidate, and Bureau sensitive species on all BLM-administered land.	Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species on all BLM-administered land.	Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species on all BLM-administered lands.
	Implement standards and guidelines for SEIS special attention species.		
Acres managed for all federal candidate category 1 and 2, state listed, and Bureau sensitive species	212,000	212,000	212,000

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species where such mitigation would not diminish commercial use.	On public domain lands: manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species.  For O&C lands: same as A, plus manage habitats of federal candidate, state listed, and Bureau sensitive species if known to occur only on BLM lands.	Areas that contain clusters of special status species are included where possible in restoration and retention areas for biological diversity.  On public domain lands: manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species.  For O&C lands: Same as B.	Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species on all BLM-administered lands.	Manage habitats of federal candidate, state listed, state candidate, and Bureau sensitive species on all BLM-administered lands.
1,100	19,160	19,160	212,000	212,000

Table 2-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Wildlife (including Fisheries) Habitat</b>			
Cavity dweller objective (percent of optimum woodpecker potential)	60	60	40
Dead and down woody material retained (tons/acre)	<p>West side: leave 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long.</p> <p>East side: Retain, where available dead and down materials at approx. 5 tons per acre including 50 lineal feet of logs per acre greater than or equal to 12 inches in diameter and 8 feet long.</p>	<p>Mixed conifer/true fir: 10 tons per acre, including 2 pieces 20 inches in diameter and greater than 8 feet long and totalling at least 100 linear feet.</p> <p>Ponderosa Pine: 5 tons per acre including 3 pieces 12 inches in diameter and greater than 8 feet and totalling at least 50 linear feet.</p>	<p>West Side: 3 logs per acre, 24 inches diameter with length being the longest available.</p> <p>East Side: 6 logs per acre, at least 24 inches in diameter and 40 feet in length.</p>
<b>West Side</b>			
Seed (percent) harvested acres to legumes and/or grasses	up to 40	40	0
Wet meadows buffer width (in feet)	150	150	0

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
Leave all snags where consistent with safety consideration	40	60	Same as C	Same as C
None	None	Mixed conifer/true fir: 10 tons per acre, including 2 pieces per acre, 20 inches in diameter and longer than 50 feet.  Ponderosa Pine: 5 tons per acre including 3 pieces 12 inches in diameter and greater than 8 feet and totalling at least 50 linear feet.	Same as C	Same as C
25	25	50	75	100
75	100	150	200	400



**Table 2-1. Comparisons of Allocations and Management by Alternative (continued).**

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Wildlife (including Fisheries) Habitat</b>			
Seasonal wetlands buffer width (in feet)	150	100	0
Cliffs/Talus slopes buffer width (in feet)	100	100	0
Dry meadows buffer width (in feet)	100	100	0
Wooded swamps buffer width (in feet)	150	100	0
<b>East Side</b>			
Seed (percent) harvested acres to legumes and/or grasses	40	40	0
Wet meadows buffer width (in feet)	150	150	0
Seasonal wetlands buffer width (in feet)	150	100	0
Cliffs/Talus slopes buffer width (in feet)	100	100	0
Dry meadows buffer width (in feet)	100	100	0
Wooded swamps buffer width (in feet)	150	100	0

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
75	100	150	200	400
25	50	75	100	100
25	50	75	100	100
50	75	100	100	100
25	25	50	75	100
75	100	150	200	400
75	100	150	200	400
0	25	50	75	100
25	50	75	100	100
50	75	100	100	100

**Table 2-1. Comparisons of Allocations and Management by Alternative (continued).**

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Special Areas</b>			
New RNA/ACECs designated	1	1	0
New other ACECs designated <sup>12</sup>	3	3	0
Acres in RNA/ACECs	520	500	0
Acres in other ACECs <sup>12</sup>	7,680	7,680	0

**Allocations/Management Actions by Alternative for Recreation**

Sites available for recreation	15-50	5-21	3
Miles of maintained trails	8-118	2-53	1
Miles of road open year-round	283	292	371
Miles of road with OHV use limited	150	144	65
Miles of road closed year-round	44	41	41
Acres open year-round to OHV use	102,000	183,000	183,000
Acres with OHV use limited	105,600	90,000	27,500
Acres closed year-round to OHV use	4,300	3,000	1,500

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
0	1	1	1	1
0	3	4	8	8
0	0	500	500	500
0	7,680	8,300	9,100	9,100
3-12	5-17	5-20	8-24	8-24
2	2-18	2-55	3-55	3-55
477	477	292	244	244
0	0	144	172	172
0	0	41	61	61
211,700	211,700	108,000	45,000	45,000
300	300	101,000	144,000	144,000
3	3	3,000	23,000	23,000

Table 2-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Wild and Scenic Rivers</b>			
River segments/miles found suitable for designation as Recreational	0/0	0/0	0/0
River segments/miles found suitable for designation as Scenic	1/11.0	1/11.0	1/11.0
River segments/miles found suitable for designation as Wild	0/0	0/0	0/0

**Allocations/Management Actions by Alternative for Visual Resources****Management Standards**

Manage as VRM Class II all BLM lands within ¼ mile of developed recreation sites, the Pacific Crest Trail, Spencer Creek, state scenic waterways and rivers designated scenic under the National Wild & Scenic Rivers Act. No less than VRM Class III management would be provided within ¼ mile of rural interface areas and state and federal highways. The remaining lands would be managed as inventoried.

Manage as VRM Class II all BLM lands within ¼ mile of developed recreation sites, the Pacific Crest Trail, Spencer Creek, state scenic waterways and rivers designated under the National Wild and Scenic Rivers Act. No less than VRM Class III management would be provided within ¼ mile of rural interface areas and state and federal highways. The remaining lands would be managed as inventories.

Manage all BLM lands following VRM classes established in the Jackson-Klamath and Lost River Management Framework plans.

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
0/0	0/0	1/11.0	0/0	0/0
0/0	0/0	0/0	1/11.0	6/34.2
0/0	0/0	0/0	0/0	0/0
Manage available forest lands as VRM Class IV and all other lands as inventoried.	Manage available forest lands as inventoried within ¼ mile of recreation sites, state and federal highways and designated rivers.  Manage other available forest land as VRM Class IV. Manage all other lands as inventoried.	Same as A, except on available forest land where BLM-administered land is more than half of a watershed, manage as inventoried.	Manage all lands as inventoried.	Same as D, except manage as VRM Class III all lands inventoried as Class IV, and manage as Class I all lands within ¼ mile of recreation sites, state and federal highways and designated rivers.



**Table 2-1. Comparisons of Allocations and Management by Alternative (continued).**

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Visual Resources (continued)</b>			
<b>Acres managed</b>			
Visual Resource Management Class I	0	0	150
Visual Resource Management Class II	33,500	33,500	17,550
Visual Resource Management Class III	81,800	81,800	53,500
Visual Resource Management Class IV	96,700	96,700	140,800

**Allocations/Management Actions by Alternative for Cultural Resources**

Acres reserved as Native American traditional use areas	4,140	4,140	0
Acres nominated to National Register of Historical Places/#sites	5,000/50	175/25	0/0
Acres per year requiring cultural survey	4,500	2,930	0

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
0	0	0	0	3,800
22,600	28,900	32,800	34,600	68,400
49,800	52,100	62,100	81,100	139,800
139,600	131,000	117,100	96,300	0
1,180	1,680	4,140	5,640	7,140
0/0	14/2	175/25	560/80	840/120
2,790	2,750	2,930	3,270	2,316

Table 2-1. Comparisons of Allocations and Management by Alternative (continued)

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Land Tenure</b>			
Management direction	Make land tenure adjustment to benefit a variety of uses and values. Emphasize opportunities that conserve Biological Diversity, enhance ecosystem management or improve management efficiency.	Exchanges of O&C lands to conserve biological diversity or enhance timber management opportunities would be pursued. Public domain lands east of Highway 97 could be exchanged to conserve biological diversity or benefit one or more resources managed.  Public domain lands could be sold if they may FLPMA criteria.	Public lands could be exchanged for private lands where important resource values would be acquired or management efficiency would be increased.
Acres identified for retention (zone 1)	186,000	183,443	190,840
Acres potentially suitable for exchange only (zone 2)	3,000	22,880	16,640
Acres potentially suitable for sale or exchange (zone 3)	23,000	5,677	4,520

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
Exchanges could occur to enhance non-declining timber harvest level of the commercial forest lands. No commercial timber or range land could be sold or leased.	Exchanges of O&C or public domain lands could occur to emphasize opportunities primarily to enhance timber or grazing management opportunities. O&C or public domain lands, other than available commercial forest or grazing lands, could be sold if they met criteria of FLPMA sec. 203(a).	Same as B, except exchanges could be made to contribute to conservation of biological diversity.	Exchanges to acquire lands with non-timber non-grazing values would be emphasized. Lands other than available commercial forest or range lands could be sold if they met criteria (1) or (2) of FLPMA sec. 203(a).	Same as D
183,443	183,443	183,443	188,443	183,443
22,880	22,880	22,880	22,880	22,880
5,677	5,677	5,677	5,677	5,677

**Table 2-1. Comparisons of Allocations and Management by Alternative (continued).**

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Hydroelectric or Alternative Energy Projects</b>			
Right-of-way grant for the Salt Caves hydroelectric project	ROW would neither be accepted nor denied until Congress or the Secretary of the Interior acts on designation of the upper Klamath River.	ROW would neither be accepted nor denied until Congress acts on designation of the upper Klamath River	ROW would be denied
Right-of-way grant for pumped storage or alternative energy projects	ROW could be approved or denied	ROW could be approved or denied	ROW could be authorized

**Allocations/Management Actions by Alternative for Rights-of-Way**

Rights-of-way avoidance areas (acres) <sup>13/14</sup>	58,080	Same as Common	9,385
Rights-of-way exclusion areas (acres) <sup>13/14</sup>	840	Same as Common	0

**Allocations/Management Actions by Alternative for Access/Withdrawals**

Acquire access to public lands <sup>14</sup>	Acquire public access to public lands to assist various programs to meet management objectives.	Same as Common	Same as Common
Evaluation of withdrawals <sup>14</sup>	Protect lands with important resource values and/or significant levels of investment by withdrawing them from operation of the public land and mineral laws.	Same as Common	Same as Common

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
ROW would be issued	ROW would be issued	ROW would neither be accepted nor denied until Congress acts on designation of the upper Klamath River.	ROW would neither be accepted nor denied until Congress acts on designation of the upper Klamath River.	ROW would be denied
ROW would be issued	ROW would be issued	ROW could be issued	ROW could be issued	ROW would be issued
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common



**Table 2-1. Comparisons of Allocations and Management by Alternative (continued).**

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Energy and Mineral Management</b>			
Acres available for oil and gas and geothermal leasing <sup>15</sup>	238,400	238,400	238,400
Acres closed to oil, gas and geothermal leasing	300	300	300
Acres open to mining claim location and operation	229,500	231,600	231,600
Acres closed to mining location <sup>16</sup>	6,400	4,300	4,300
Acres available for salable mineral disposal	222,500	223,000	233,900
Acres closed to salable mineral disposal	14,800	14,300	3,400

### **Allocations/Management Actions by Alternative for Rural Interface Area Management**

Acres considered for alternative forest management practices	3,050	3,050	0
Acres where clearcutting and herbicide spraying excluded	0	0	0
Acres managed for VRM Class II objectives	0	0	0
Acres managed for VRM Class III objectives	3,050	3,050	0
Acres where prescribed burning excluded	0	0	0

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
238,400	238,400	238,400	238,400	238,400
300	300	300	300	300
231,600	231,600	231,600	231,600	231,600
4,300	4,300	4,300	4,300	4,300
230,300	221,400	220,200	219,600	204,900
7,000	15,900	17,100	17,700	32,400
0	2,800	3,050	3,050	4,500
0	2,800	3,050	3,050	4,500
0	0	0	3,050	4,500
0	2,800	3,050	0	0
0	0	0	3,050	0

Table 2-1. Comparisons of Allocations and Management by Alternative (continued).

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Livestock Grazing</b>			
Number of AUMs annually on 95 grazing allotments	12,978	12,978 <sup>17</sup>	13,662 <sup>17</sup>
Construct reservoirs (each)	68	51	0
Develop springs (each)	14	9	0
Miles of fence to build	58.5	41.5	0
Control competing vegetation (acres)	12,950	12,670	0

**Allocations/Management Actions by Alternative for Road Management**

Construction (miles of road)	17	22	32
Motorized access	Allows motorized access	Allows motorized access	Allows for moderate access
Road closures	Limit open road densities to 1.5 miles per square mile.	Limit open road densities to 1.5 miles per square mile.	Provide moderate amount of seasonally and permanent road closures

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
16,894	14,140	12,503	11,406	9,649
55	51	51	48	44
9	9	9	9	9
28	34.5	43.5	42.5	38
12,370	12,630	12,670	12,670	11,490
26	24	21	28	1
Allows for substantial access	Allows for substantial access	Allows motorized access	Provides limited access	Provides limited access
Allowed where no conflict with timber production	Same as A	Same as DRMP Preferred	Same as DRMP Preferred	Same as DRMP Preferred

**Table 2-1. Comparisons of Allocations and Management by Alternative (continued).**

	PRMP	DRMP Preferred	No Action
<b>Allocations/Management Actions by Alternative for Noxious Weed Control</b>			
Treatment of noxious weeds <sup>13</sup>	Follow Noxious Weed Control Final EIS 1986 and 1987. Follow current local plan and environmental assessment.	Same as Common	Same as Common

**Allocations/Management Actions by Alternative for Hazardous Materials**

Handling of hazardous materials <sup>13</sup>	Eliminate known hazardous materials on BLM-administered lands.	Same as Common	Same as Common
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**Allocations/Management Actions by Alternative for Fire**

Acres per year prescribed burning for site preparation and silvicultural hazard reduction	250	300	1,850
Acres per year prescribed burning for wildlife habitat and forage enhancement	740	740	200
Acres per year natural and/or artificial ignition prescribed fire for ecosystem enhancement	up to 7,500	6,500	0

Table 2-1. Comparisons of Allocations and Management by Alternative.

A	B	C	D	E
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
Same as Common	Same as Common	Same as Common	Same as Common	Same as Common
2,200	2,200	200	350	40
740	730	740	720	650
0	0	6,500	8,100	10,300



Table 2-1. Comparisons of Allocations and Management by Alternative (continued)

Footnotes:

- <sup>1</sup> The Management Direction Common to Alternatives A through E does not in all cases apply to the Alternative No Action. More detail on management direction is provided in the text of Chapter 2. See below for abbreviations used in the table.
- <sup>2</sup> Order 1 and 2 perennial stream would have a 75-foot riparian management area.
- <sup>3</sup> No Action is based on stream classes not order. See Chapter 2 text.
- <sup>4</sup> Order 1, 2, and 3 fish-bearing streams would have a 150-foot riparian management area.
- <sup>5</sup> Riparian management area established on 1.5 miles of selected streams to protect beneficial uses.
- <sup>6</sup> Riparian management area established on 3.4 miles of selected streams to protect beneficial uses.
- <sup>7</sup> Does not include suitable woodlands (predominately juniper woodlands), for which no detailed inventory has yet been done.
- <sup>8</sup> See Appendix 4-C for explanation of the difference in acres between actual harvest and TRIM-PLUS harvest acres.
- <sup>9</sup> The Alternative No Action did not have Trim harvest acres under this plan.
- <sup>10</sup> The probable sale quantity shown may vary by plus or minus 40 percent due to changes resulting from further land classification, stream inventory, and watershed analysis. The acres associated with timber harvest activities would also vary by plus or minus 40 percent.
- <sup>11</sup> Each alternative includes juniper woodland as available for enhancement of other uses.
- <sup>12</sup> An "other area of critical environmental concern" is one that is not also a research natural area.
- <sup>13</sup> See Chapter 2 text for definitions of avoidance and exclusion area criteria.
- <sup>14</sup> See text in Common to Alternatives A through E.
- <sup>15</sup> There would be 1,400 acres less of geothermal resources throughout all alternatives.
- <sup>16</sup> An additional 1,500 acres closed to non-metalliferous mineral location throughout all alternatives.
- <sup>17</sup> AUM figure is a correction of incorrect totals found in the draft plan, not actual changes in grazing use.

Abbreviations used in this table:

ACEC = area of critical environmental concern	AUM = animal unit month
DRMP = draft Resource Management Plan	FLPMA = Federal Land Policy and Management Act
MMBF = million board feet	MMCF = million cubic feet
N/A = Not Applicable	O&C = Oregon and California
OHV = off-highway vehicle	PRMP = Proposed Resource Management Plan
PSQ = probable sale quantity	ROW = right-of-way
RMA = riparian management area	RNA = research natural area
SEIS = Supplemental Environmental Impact Statement	VRM = Visual Resource Management

**Table 2-13. Withdrawals.**

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
BLM Order <sup>1</sup> 6/14/57 ANS 57	40S	10E	9 10	80.00 80.00 160.00	Air navigation	A	FAA	Modify withdrawal, 80 acres continued, 80 acres returned to BLM, not all land used by withdrawing agency.	Refer to Table 2-14 for future management by alternative of lands to be returned to BLM administration. Continuation of a portion of the FAA withdrawal common to all alternatives.
SO of 2/11/47	39S	9E	21	51.12	Kingsley Field	B	USAF	Modify withdrawal. Portion not needed by holding agency, portion continued in withdrawal.	Land will continue to be used for Air Force purposes, remainder sold by GSA to City of Klamath Falls.
EO 5907	39S 38S	13E 13E	2 34 35	78.87 40.00 40.00 158.87	Public Water Reserve 146	D	BLM	Not evaluated	
EO of 1/24/1914	41S 40S 41S 40S	13E 13E 12E 12E	6 19 1 24	52.14 189.55 40.00 160.00 441.69	Public Water Reserve 15	D	BLM	Not evaluated	
SO 234	40S	10E	11	80.00	Public Water Reserve 107	D	BLM	Not evaluated	
SO 214	41S	14.5E	1	640.00	Public Water Reserve No. 107	D	BLM	Not evaluated	

Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
PLO 3869	39S	13E	2	160.00	Gerber Reservoir recreation site	B	BLM	Continue withdrawal. BLM's investment still in need of protection. Use as a developed recreation site and campground will continue for the duration of the plan.	Continuation of the withdrawal is common to all alternatives.
	38S	5E	21	80.00	Surveyor Mountain recreation site	B	B		
	40S	7E	6	14.35 254.35	Topsy recreation site	B	BLM		
PLO 3274 <sup>1</sup>	39S	9E	21	10.04	Administrative site	B	FWS	Transfer jurisdiction of the 10.04 acre administrative site to BLM. Site no longer needed by Fish and Wildlife Service.	Transfer of jurisdiction is common to all alternatives. Use as an administrative site will continue for the duration of the plan. More buildings to be constructed.
PLO 4876	38S	6E	21	9.69	Protect road use	B	BLM/FS	Not evaluated	
PLO 487836S	15E	28	32	14.00 9.00 23.00	Protect road use	B	BLM/FS	Not evaluated	

Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
SO of 7/9/1904	39S	14E	5	240.05 <sup>1</sup>	Klamath Basin Reclamation Project	B	BR/BLM	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration.	Refer to Table 2-14 for future management by alternative of lands to be returned to BLM administration.
			6	486.36 <sup>1</sup>					
			7	209.43 <sup>1</sup>					
			8	240.00 <sup>1</sup>					
			17	640.00 <sup>1</sup>					
			18	529.98 <sup>1</sup>					
			19	400.00 <sup>1</sup>					
			20	360.00 <sup>1</sup>					
			21	160.00 <sup>1</sup>					
			22	160.00 <sup>1</sup>					
			31	80.00 <sup>1</sup>					
	38S	14E	32	80.00					
				3,585.82					
SO of 7/27/1904 <sup>1</sup>	38S	13E	35	120.00	Klamath Basin Reclamation Project	B	BR/BLM	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration.	Refer to Table 2-14 for future management by alternative of lands to be returned to BLM administration.
			1	80.00					
			2	78.87					
			11	80.00					
			12	640.00					
			13	320.00					
			14	160.00					
			23	320.00					
			26	320.00					
			27	280.00					
			33	240.00					
			34	240.00					
				2,878.87					
SO of 1/28/1905 <sup>2</sup>	37S	8E	17	68.70	Klamath Basin Reclamation Project/Upper Klamath National Wildlife Refuge	B	FWS/BR	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Withdrawal overlaps USFWS withdrawal.	Property to be under administration of Klamath Basin NWR, USFWS. Future management subject to site specific NEPA analysis.
			25	379.94					
			26	17.67					
			35	161.82					
			36	500.10					
				1,128.23					

Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
SO of 1/20/1910 <sup>2</sup> Lands within Winema NF	34S	6E	2	44.59	Klamath Basin Reclamation Project/Winema National Forest	B	FS/BR	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Withdrawal overlaps USFWS withdrawal.	Property to be under administration of Winema National Forest. Future management subject to site specific NEPA analysis.
			11	438.73					
			14	440.00					
			23	140.00					
			26	358.83					
	36S	6E	35	242.70					
			10	80.00					
			11	160.00					
				1,904.85					
SO of 1/20/1910 <sup>2</sup> (Continued) Same lands included in EO 2416	34S	6E	25	480.00	Klamath Basin Reclamation Project/Upper Klamath National Wildlife Refuge	B	FWS/BR	Revoke withdrawal. With- drawal relinquished by holding agency, no longer needed for project purposes. Withdrawal overlaps USFWS withdrawal.	Property to be under administration of Klamath Basin NWR, USFWS. Future management subject to site specific NEPA analysis.
			26	120.00					
			35	200.00					
			36	640.00					
			1	640.00					
	35S	6E	2	280.24					
			12	640.00					
			13	640.00					
			24	640.00					
			35	320.00					
	36S	6E	36	640.00					
			1	640.00					
			2	560.00					
			3	80.00					
			11	480.00					
			12	640.00					
			13	400.00					
			14	320.00					
				8,361.84					
SO of 1/20/1910 <sup>1</sup> (Continued)	34S	6E	1	239.23	Klamath Basin Reclamation Project	B	BR	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration.	Refer to Table 2-14 for future management by alternative of lands to be returned to BLM administration.
			12	640.00					
			13	316.86					
				1,196.09					

Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
SO of 6/25/1919 Same lands included in EO 924	41S	10E	15	159.80	Klamath Basin Reclamation Project/Upper Klamath National Wildlife Refuge	B	FWS/BR	Continue withdrawal. Property still needed for project purposes.	Property will continue to be managed jointly by the BR and the USFWS.
			16	74.10					
			3	405.20					
			4	648.40					
			5	405.25					
			6	324.16					
			8	567.68					
			9	648.76					
			10	647.92					
			14	396.39					
			15	387.32					
			16	373.92					
			17	359.46					
			18	344.80					
	41S	8E	1	344.32					
			4	72.30					
			9	149.50					
			11	40.00					
			12	324.44					
			13	167.10					
			14	40.00					
			15	291.20					
			16	91.80					
			40S 8E 24	40.00					
				7,303.82					
SO of 7/31/1919 <sup>1</sup>	39S	11E	19	80.00	Klamath Basin Reclamation Project	B	BR/BLM	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Right-of-way issued to protect BR interests. Suitable for return to BLM administration.	Refer to Table 2-14 for future management by alternative of lands to be returned to BLM administration.



Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
SO of 6/20/1922	41S	14E	19	29.55	Klamath Basin Reclamation Project	B	BR/BLM	Continue withdrawal. Property still needed for project purposes.	Property will continue to be managed jointly by the BR and the BLM
SO of 2/25/1939 <sup>1</sup>	39S	12E	22	40.00	Klamath Basin Reclamation Project	B	BR/BLM	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration.	Refer to Table 2-14 for future management by alternative of lands to be returned to BLM administration.
			26	80.00					
				120.00					
SO of 4/21/1940 <sup>1</sup>	40S	14E	5	41.04	Klamath Basin Reclamation Project	B	BR/BLM	Revoke withdrawal. Withdrawal relinquished by holding agency, no longer needed for project purposes. Suitable for return to BLM administration.	Refer to Table 2-14 for future management by alternative of lands to be returned to BLM administration.
SO of 2/21/1946	41S	14E	15	80.00	Klamath Basin Reclamation Project	B	BR/BLM	Continue withdrawal. Property still needed for project purposes.	Property will continue to be managed jointly by the BR and the BLM.
			20	240.00					
			21	307.06					
			22	354.92					
			23	81.82					
				1,063.80					
SO of 2/11/1947	39S	9E	20	13.30 <sup>1</sup>	Klamath Basin Reclamation Project	B	BR/BLM	Modify withdrawal. Continue or revoke portions of the withdrawal as requested by holding agency. Property no longer needed for project purposes. Rights-of-way issued to protect BR interests on lands to be returned to BLM administration.	Use of portions of the property as a BR administrative site will continue. Refer to Table 2-14 for future management by alternative of lands to be returned to BLM administration.
			21	12.06					
			21	1.20 <sup>1</sup>					
			22	7.50 <sup>1</sup>					
			25	7.70					
			27	18.40					
				60.16					

Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
FPC Order 11/17/1930	40S	8E	33	1.52	Protect electric transmission line	B	BLM/FERC	Not evaluated	Joint management to continue.
PSR 579	41S	6E	2	80.00	Protect water, power, and reservoir development potential	C	BLM/FERC	Not evaluated	Joint management to continue. BLM finds segment 2 of the Klamath River suitable for designation as scenic under the WSR Act, pending a decision by the Congress.
			7	40.00					
			10	80.00					
			18	113.95					
				313.95					
WPD 3 Same lands included in PSR 582	41S	6E	2	440.00	Protect water, power, and reservoir development potential	C	BLM/FERC	Not evaluated	Joint management to continue. BLM finds segment 2 of the Klamath River suitable for designation as scenic under the WSR Act, pending a decision by the Congress.
			3	480.00					
			5	40.00					
			7	512.58					
	40S	6E	1	151.54					
			11	240.00					
			13	550.15					
			23	578.25					
			27	280.00					
			35	312.53					
	41S	5E	13	30.54					
				3,615.19					
PSR 258	41S	6E	4	40.00	Protect water, power, and reservoir development potential	C	BLM/FERC	Not evaluated	Joint management to continue. BLM finds segment 2 of the Klamath River suitable for designation as scenic under the WSR Act, pending a decision by the Congress.
			8	360.00					
			10	80.00					
	40S	6E	12	294.03					
			14	216.09					
			26	288.15					
			34	309.83					
	41S	5E	13	23.24					
				1,611.34					

Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management								
	T	R	S														
Power project 10199 Salt Caves proposal	40S	6E	14	45.00	Protect water, power, and reservoir development potential	B	BLM/FERC	Not evaluated	Joint management to continue. BLM finds segment 2 of the Klamath River suitable for designation as scenic under the WSR Act, pending a decision by the Congress.								
			23	147.15													
			26	150.32													
			27	13.56													
			34	115.70													
	41S	6E	35	76.28													
			3	76.53													
			5	28.08													
			7	146.13													
			8	111.86													
	41S	5E	9	168.92													
			10	8.79													
			1	8.15													
			12	11.89													
			13	13.98													
			1,122.34														
Power project 2082	40S	7E	6	14.47	Protect J.C. Boyle power project	B	BLM/FERC	Not evaluated	Joint management to continue.								
			40S	6E						1	23.41						
										12	67.00						
										13	40.74						
										14	27.33						
	23	16.68															
			26	7.40													
			27	1.23													
			34	2.80													
			35	11.17													
			41S	6E						3	8.24						
	10	4.89															
	225.36																
	PSC 2	41S								5E	12	6.42	Protect water, power, and reservoir development potential	C	BLM/FERC	Not evaluated	Joint management to continue. BLM finds segment 2 of the Klamath River suitable for designation as scenic under the WSR Act, pending a decision by the Congress.

Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
Power project 10518-000 preliminary permit	40S	10E	11	200.00	Protect water, power, and reservoir development potential	B	BLM/FERC	Not evaluated	Joint management to continue.
			14	240.00					
			24	120.00					
				560.00					
Power project 10233 preliminary permit	40S	13E	30	80.00	Protect water, power, and reservoir development potential	B	BLM/FERC	Not evaluated	Joint management to continue.
			31	400.00					
	41S	12E	1	120.00					
			6	640.00					
	41S	13E	7	360.00					
			8	40.00					
			17	200.00					
			18	40.00					
			19	40.00					
			20	80.00					
				2,000.00					
Power project 10897 preliminary permit Russell Canyon	40S	13E	35	40.00	Protect water, power, and reservoir development Potential	B	BLM/FERC	Not evaluated	Joint management to continue.
			5						
	41S	13E	6						
			7						
			8						
			9						
			17						
			18						
Power project 11136 preliminary permit Stukel Mountain	40S	10E	11	200.00	Protect water, power, and reservoir development potential	B	BLM/FERC	Not evaluated	Joint management to continue.
			14	240.00					
			24	120.00					
				560.00					

Table 2-13. Withdrawals (continued).

Authority	Location			Acreage	Purpose	Segregative Effect	Surface Management Agency	Revocation/Termination Recommendation and Rationale	Future Management
	T	R	S						
Power project 11138 preliminary permit Stukel Mountain	40S	10E	11 14 24	200.00 240.00 120.00 560.00	Protect water, power, and reservoir development potential	B	BLM/FERC	Not evaluated	Joint management to continue.
Power project 10897 preliminary permit Lorella pumped storage project	40S	12E	12	640.00	Protect water, power, and reservoir development potential	B	BLM/FERC	Not evaluated	Joint management to continue.
Power project 10970 preliminary permit Smith Reservoir pumped storage project	40S	13E	7 8 17 18	497.11 360.00 280.00 292.05 1,429.16	Protect water, power, and reservoir development potential	B	BLM/FERC	Not evaluated	Joint management to continue.
Acreage Summary (does not include overlapping withdrawals):							Acreage Summary (overlapping withdrawals):		
BLM Administrative Sites				214.00	B				
BR				8,815.00	B		USFWS/BR	16,775.00	B
Public Water Reserves				1,321.00	D				
USFW				10.00	B		BR/USFS	1,905.00	B
Other Agency				211.00	A or B				
Powersites				5,547.00	C				
Power Projects				3,909.00	B				
Stock Driveways				160.00					

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**Table 2-13. Withdrawals (continued)**

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**Abbreviations:**

ANS	- Air Navigation Site	BR	- Bureau of Reclamation
PLO	- Public Land Order	FAA	- Federal Aviation Administration
PSC	- Power Site Classification	GSA	- General Services Administration
PSR	- Power Site Reserve	USFWS	- U.S. Fish and Wildlife Service
WPD	- Water Power Designation	NWR	- National Wildlife Refuge
SO	- Secretarial Order	NEPA	- National Environmental Policy Act
EO	- Executive Order	WSR Act	- Wild and Scenic Rivers Act
FERC	- Federal Energy Regulatory Commission	USFS	- U.S. Forest Service

Table does not include lands that have been transferred out of federal ownership subsequent to withdrawal.

**Segregative Effect:**

- A - Withdrawn from operation of the general land laws, the mining laws, and the mineral leasing laws.
- B - Withdrawn from operation of the general land laws and the mining laws.
- C - Withdrawn from operation of the general land laws only, but open to entry and to mining claim location subject to section 24 of the Federal Power Act.
- D - Withdrawn from operation of the general land laws and closed to non-metalliferous mining (cement quality limestone, diatomite etc.), but open to metal mining (gold, silver, mercury etc).

**Footnotes:**

<sup>1</sup> Withdrawals relinquished; land suitable for return to BLM administration.

<sup>2</sup> Reclamation withdrawal relinquished; administration returned to other withdrawing agency.



# Management Direction Common to Alternatives A through E

The following management direction would apply to Alternatives A through E. Significant exceptions to this direction are noted in the descriptions of the alternatives.

The costs of implementing the alternatives would vary, primarily according to the complexity of management proposed and the amount of timber that would be offered for sale. For most of the programs the costs of management would not vary substantially among the alternatives; however, implementation of some management actions could depend upon the availability of funding or positions. Funding of management actions is discussed in the Use of the Completed Plan section at the end of this Chapter.

All acres given are approximations. These figures are given as a relative means of comparing management actions across the alternatives. They also provide a relative base for analyzing the effects of management actions (see Chapter 4) across the alternatives.

Land management practices of adjacent landowners would be considered during site-specific land management planning.

Inherent in all management practices is a goal of maintaining long-term site productivity of soils. Achievement of this goal would be accomplished by using best management practices and minimizing disturbance of fragile areas.

All BLM fire activities that affect air quality would be conducted in accordance with the Oregon State Implementation Plan, administered by the Oregon Department of Environmental Quality, and the Oregon Smoke Management Plan, administered by the Department of Forestry.

## Water Quality and Riparian Zones

### Water Quality

The Clean Water Act as amended directs federal agencies to comply with state water quality requirements to restore and maintain water quality necessary to protect identifiable beneficial uses.

The Federal Water Quality Act of 1987 directs federal agencies to comply with state laws and regulations pertaining to the beneficial uses (see Glossary) identified by the states and any applicable water quality standards that have been established. The State of Oregon has established a list of beneficial uses for the Klamath Basin (Oregon Administrative Rule 340-41-962) and water quality standards that provide protection for those uses. To assure protection of water and water-dependent resources, the BLM would continue to implement a nonpoint source (see Glossary) management program in cooperation with the U.S. Environmental Protection Agency and the Oregon Department of Environmental Quality.

Management actions would be planned to be consistent with Oregon's adopted Statewide Water Quality Management Plan for forest practices, and comply with Oregon's Water Quality Standards and Guidelines (OAR 340-41). Best management practices would be selected based on site-specific conditions, feasibility, and the water quality standards for potentially affected waters (see Appendix F). Mining, timber, grazing, recreation, off-highway vehicle use, and other activities would be regulated to protect water quality and riparian zones.

Degradation of water quality would not be permitted if it would interfere with or become injurious to the established beneficial uses of water within those segments of a river designated under the National Wild and Scenic Rivers Act.

Floodplains and wetlands will be protected in accordance with Executive Orders 11988 and 11990.

In accordance with the BLM Riparian-Wetlands Initiative for the 1990s, management would emphasize:

- ♦ restoration and maintenance of riparian-wetland areas;
- ♦ protection of riparian-wetland areas and associated uplands; and
- ♦ partnership and cooperative restoration and management of riparian-wetland areas.

New roads and associated structures would be located, designed, and constructed to minimize stream crossings and the risk of soil or other material

entering streams or other waters (such as lakes or ponds). Excavation would be limited to the practical amount needed to meet appropriate road standards. On a case-by-case basis, exposed soil would be stabilized and revegetated. Logging, road building, mining, and slash disposal methods would be designed to minimize the number and/or size of mass soil movements. Newly constructed arterial and collector roads would be surfaced, have drainage structures installed, and be maintained routinely. On a case-by-case basis, temporary or permanent roads and trails could be closed (to prevent casual use and erosion) or obliterated (to mitigate past impacts and to put the area back into vegetative production). Closures would be accomplished with barricades or blockages, while obliteration of roads and trails would occur through subsoiling, waterbarring, and seeding and/or planting.

To minimize soil erosion and the effects of land management activities on surface waters, fragile non-suitable sites would be excluded from the timber production base (see Appendix 3-A in the draft).

An analysis of the cumulative effects by analytical watershed in the Environmental Impact Statement for this Resource Management Plan may guide overall timber sale scheduling during the life of the plan; however, effects to water in the watersheds would be analyzed for individual timber sales to determine if there were significant differences from those identified in the Resource Management Plan/Environmental Impact Statement. This would be part of annual timber sale planning to incorporate the most current available information regarding recent and projected rates of activity in the watershed.

Proposed projects, or management actions, would be evaluated for their cumulative effects on water quality, runoff, and stream channel conditions. The results from the cumulative effects analysis would influence final decisions both on activity scheduling and on the application of design features and mitigation measures, including best management practices. See the discussions of Requirement for Further Environmental Analysis and Use of the Completed Plan, later in this Chapter.

Planning for chemical uses, such as herbicides, pesticides, fertilizers, and solvents, would provide for protection of both surface water and groundwater. Herbicides would not be applied within 500 feet of any residence or other place of human occupation without the occupant's consent or within 100 feet of any croplands. They would not be applied by helicopter within 100 feet of any surface waters, by

ground vehicles having boom sprayers within 25 feet of water, or by vehicle-mounted handguns or backpacks within 10 feet of water.

Several undisturbed watersheds throughout the state could be designated by the BLM as water quality monitoring areas. These would be used as controls for water quality monitoring and as baselines for paired watershed studies. Systematic inventories of riparian areas, streams, water quality, and watershed conditions would be conducted where baseline information is absent or lacking to determine feasible maintenance, restoration, and enhancement actions. Ecological site information for lands in these areas would be obtained.

If possible, land would be exchanged or obtained through other mutual agreements to increase the amount of BLM-administered land in riparian zones. This would consolidate BLM ownership in watersheds to facilitate better management.

A Watershed Management Practices Guide would be developed by the Klamath Falls Resource Area for the maintenance of water quality and soil productivity and to assist in the selection of project design features and best management practices for various management activities.

Intensive grazing management systems would be implemented in areas where the soil conditions are in the moderate, severe, or critical erosion categories (see Chapter 3, Livestock Grazing and Water Resources sections, and Map 3-3 in the draft).

Headcuts and gullies on watershed uplands would be rehabilitated where feasible. Burned areas with critical or severe erosion hazards would be rehabilitated. Some treatment projects, such as juniper thinning or brush control, would be implemented to improve perennial grass cover conditions or wildlife habitat. Current grazing management practices would be modified through allotment management plans, coordinated resource management plans, agreements, decisions, etc., to resolve water quality, watershed conditions, and riparian conflicts and/or concerns. Watershed and riparian objectives would be achieved through improved livestock distribution and management through fencing, brush control, spring and other water source development, and through changes in livestock numbers and/or season of use. Existing enclosures would be maintained where appropriate to meet identified resource management objectives.

## Riparian Zones

Riparian zones would be managed to maintain streambanks in a stable condition along at least 90 percent of a stream's length in any given drainage. On streams with less than 90 percent stable streambanks where significant improvement has not occurred within five years of livestock removal or changes in grazing or other land management actions, streambank stabilization and instream projects would be implemented. Areas where water quality is being adversely affected would be given high priority for treatment to minimize effects and/or eliminate causes (see discussion in the Water Quality section).

Monitoring of riparian zone conditions would occur periodically to identify any unanticipated impacts resulting from implemented management actions. The information obtained from monitoring would be used in allotment evaluations and in the subsequent development of mitigating measures, including best management practices.

Vegetation could be manipulated to enhance springs, wetland areas, and riparian zones. Existing snags, riparian vegetation, and woody debris in riparian zones would not be removed or managed to maintain or enhance stream channel and bank structure. Placement of woody debris, creation of snags, or planting of conifers or riparian species could be used to enhance riparian condition. Conifers and woody riparian species would be planted in riparian areas adjacent to streams where previous management activities or natural disasters have removed them.

New water source development and reconstruction of existing developments would be designed to protect riparian values. Surface occupancy for leasable mineral exploration or development would be prohibited in certain riparian zones. Roads would not be constructed through the length of a riparian zone. The area of a road that crosses a riparian zone would be minimized to avoid impacts to vegetation, soil, and water resources (see the Road Management section).

Grazing management practices in riparian zones would either provide for regrowth of riparian plants or leave sufficient vegetation after use for maintenance of plant vigor and streambank protection.

Implementation of the Gerber Riparian Demonstration Area Plan would continue. An interpretive program would be developed to provide information and education on the intensive multiple use management systems currently being used to bring about improvements in riparian conditions. Additional riparian

improvement projects would be developed with public involvement. The BLM's Riparian-Wetlands Initiative for the 1990s would continue to be incorporated into planning management activities in the area.

No timber harvest within a riparian management area would be planned as part of the sustained yield timber management program. Riparian management areas would extend a minimum of 50 feet horizontal distance and an average distance that is wider, varying by alternative, on each side of perennial and other important streams (generally 3rd order and larger streams, see Glossary). Some tree cutting or other timber harvest activities, such as road construction, enhancement of fish and wildlife habitat, and yarding corridors to facilitate timber harvest outside the 50-foot zone, could occur in the riparian management area to achieve resource management objectives.

Brush, hardwoods, non-merchantable and non-commercial vegetation, and selected commercial vegetation necessary to streambank stability or water quality protection would not be cut or slashed in an additional 25-foot wide buffer strip, measured horizontally from each outside edge of the minimum 50-foot buffer and on all intermittent streams, whenever timber harvest activities, other than those associated with road construction, occur.

The following standards would be followed in riparian management areas:

- ◆ Yarding corridors through riparian management areas would be limited to the minimum number of feet feasible. The maximum width of any corridor would be 30 feet. Yarding of logs through the corridors would require either full-log or one-end suspension.
- ◆ All timber felled adjacent to riparian management areas would be directionally felled away from the riparian management area.
- ◆ All snags in the riparian management area would be left except where safety or fire hazard dictate removal.
- ◆ Where feasible, any trees felled within the riparian management area would be left in place unbacked (not cut into log lengths) and unlimbed (limbs not cut off the trunk), consistent with management for fish habitat.
- ◆ No skid trails would be placed in the riparian zone, except at designated crossings. All skid trails that enter riparian zones would be seeded (after use or prior to first rains, whichever comes first) to reduce erosion.

- ◆ No slashing, ripping, piling, site preparation, or other soil disturbing activities (except for designated skid trail crossings, roads, or yarding corridors) would occur in the riparian management area, although riparian enhancement or wildlife projects could be allowed.
- ◆ No more than 25 percent of the overstory canopy would be removed to facilitate yarding operations.

Additional practices and management restrictions for riparian management areas were included in Appendix 2-A in the draft. Appendix 2-B in the draft discussed the stream classification system currently in use (see the Alternative No Action) and a proposed class system that has since been replaced in the Proposed Resource Management Plan.

Agreements (such as coordinated resource management plans) would be pursued with private land owners and other land management agencies for certain riparian areas or watersheds within the planning area to help minimize impacts from timber management, grazing, or other activities.

## Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity

Forest lands in timber production capability classification categories not subject to planned timber harvest (computed in the allowable sale quantity) and forest lands allocated for other resource values (also not subject to planned timber harvest) would be available for retention, maintenance, and/or re-establishment of old growth and mature forest.

## Timber

### Allocation of Land to Timber Production

All lands allocated to timber production are classified as capable of being reforested within five years after harvest and of being managed without irreversible resource damage. Forest lands considered under the Resource Management Plan are in one of four allocation categories:

- ◆ *Intensive management.* Lands available for intensive management of timber production.
- ◆ *Restrictive management.* Lands available for restricted management of forest products.

- ◆ *Management for enhancement of non-timber resources.* Lands where the forest management activities would be for the enhancement of other uses.
- ◆ *Not allocated for management.* Forest lands not available for management of forest products.

Only lands in the intensive and restricted management categories would be subject to planned timber harvest. Timber production on these lands would be included in the estimated allowable sale quantity. Unscheduled harvests from lands in other categories would not be part of the allowable sale quantity. Lands allocated to intensive or restricted timber management would be managed for timber production consistent with the assumptions and concepts guiding the formulation of each alternative.

**Intensive Management Lands.** Silvicultural systems for intensive management lands would be designed principally to meet a high level of timber production, within a framework of mitigating measures and project design features which protect environmental quality, biological diversity, and wildlife habitat. This framework varies between the alternatives. Timber management would be the primary use with site-specific allowances made for other resource values.

**Restricted Management Lands.** On lands available for restricted timber management, silvicultural systems would be designed to meet the requirements of non-timber resource allocations and objectives. Timber production would occur at lower levels than for intensive management lands. Silvicultural practices that increase growth or timber quality would be used as appropriate.

**Enhancement of Non-Timber Resources and Lands Not Allocated for Management.** On lands actively managed for the enhancement of non-timber resources, harvesting or silvicultural manipulation would occur only as part of active management strategies aimed at the enhancement of the resource for which the allocation was established. Any unscheduled harvest of forest products on these lands would be consistent with the other resource allocations and objectives.

Allocation of acres by management category and alternative is shown in Table 2-1.

## Timber Production Practices

Land management practices of adjacent landowners would be considered during site-specific timber



## Chapter 2 - Description of the Alternatives

management planning, other specific activity planning, and project planning. Contracts, usually awarded on a competitive basis, are the means of accomplishing all timber harvest and many forest development practices. The standard and special provisions (which include mitigating measures) in a contract set forth the performance standards to be followed by the contractor in carrying out the action in accordance with applicable laws, regulations, and policies. In contract preparation, selection of special provisions is governed by the scope of the action to be undertaken and the physical characteristics of the activity site. The standard provisions of the basic timber sale contract are applicable for all timber sales. Bureau manuals and manual supplements provide a variety of approved special provisions for use, as appropriate, in individual contracts. Inherent in all timber production practices is a goal of maintaining long-term site productivity of soils.

### Transportation System

New roads would be kept to the minimum needed for management, and would be located, designed, and constructed to standards appropriate to the expected road use and the resource values affected. The BLM Oregon Manual Supplement H-5420-1 would be used in preparing road construction requirements for timber sale contracts. Construction standards would be determined during the annual timber sale planning process. See the Road Management section for more information.

### Timber Harvest

The allowable sale quantity for each alternative (except the Alternative No Action) has been calculated using a computer program called TRIM-PLUS. The capabilities of TRIM-PLUS, the rationale for selection of the model, and the allowable sale quantity calculation process were discussed in Appendix 2-C in the draft. The sustainable allowable sale quantity has been calculated in **cubic feet** and timber sales under the plan will be sold according to cubic foot measure.

On lands allocated primarily for timber production, clear-cut harvesting would only be used where silviculturally essential to accomplish relevant forest management or other resource objectives, including cost-effective management and assurance of timely reforestation. Appendix 2-C in the draft discussed timber harvest methods and silvicultural systems used in the Klamath Falls Resource Area.

Timber harvest would be accomplished by a mix of aerial, cable, and/or ground yarding systems. This

variety of logging systems and the degree of log suspension are design features used primarily for watershed protection and minimizing soil damage. The BLM Oregon Manual Supplement H-5420-1 would guide selection of harvesting techniques for timber sale contracts.

Proposed timber sales would be inventoried for existing soil compaction and designed to mitigate or avoid reductions in productivity. On most units, a network of permanent designated skid trails would be established. In timber sales on lands west of Highway 97, skid trails would be designed to affect less than 12 percent of the land. Existing skid trails would be used as much as possible. Sites where the 12 percent standard is exceeded would require treatment, such as ripping or seeding.

On lands east of Highway 97, the cumulative effects of detrimental soil conditions would not exceed 20 percent of the total acreage within an activity area (the total area of ground, in timber sale units or slash treatment areas, including roads, skid trails, and landings affected by activity). Detrimental soil conditions include compaction, displacement, and creation of cover conditions that do not meet the standards set in Appendix 2-A in the draft. Sites where the 20 percent standard is exceeded would require treatment, such as ripping or seeding.

New skid trails would be constructed on slopes averaging less than 35 percent. Operation on both new and existing skid trails would minimize soil displacement and would occur when soil moisture content provides the most resistance to compaction.

Existing skid trails not needed as part of the network of permanent designated skid trails would be ripped or tilled where conditions permit.

Because logging over snow and/or frozen ground decreases the amount of soil displacement and compaction, the number of sales that use winter logging would be increased.

Where used, clearcut unit size would generally be less than 40 acres, but could exceed 40 acres in some situations, such as economizing field operations where prompt reforestation could be assured or where harvest was conducted to salvage timber damaged by fire, disease, insects, or wind.

On west side sites where frost-sensitive species are being regenerated, protective shelterwood would be retained until the understory trees grow large enough to resist frost damage.

Uneven-age (selection) harvest methods would be used where they are silviculturally the best option and when economically feasible (when timber sale prices would exceed costs for preparation of the sale). In all cases, harvesting (either clearcut or selection) would be done in such a way that the land could be adequately restocked within five years.

Single tree selection would be employed for harvest of dying timber and timber in high-risk of dying within a short time period (mortality salvage). Mortality salvage would take place on lands in the intensive timber production base to the extent consistent with wildlife objectives, on other lands in the event of a major catastrophic event, or when beneficial to other resource values.

Commercial thinning would be applied to timber stands where practicable and where increased gains in timber production or improved stand health would be likely. The treatment interval would range from 10 to 40 years, varying by site class, with poor sites having longer intervals.

Trees could be cut or removed from land not available for timber production for the following reasons, unless their harvest would be inconsistent with other plan guidelines for management of the area:

- ♦ to harvest inclusions of trees within a harvest unit on lands mostly classified as non-suitable for timber production, to allow design of more logical management units and/or reduced road construction, thereby lessening net adverse environmental effects;
- ♦ to salvage trees or stands killed or substantially damaged by fire, wind, or other catastrophe;
- ♦ to control the spread of insect or disease outbreaks;
- ♦ to conduct experiments;
- ♦ to provide for the safety of forest users (this includes hazard tree removal in camp and picnic grounds, in administrative sites, and along trails and roads open to the public);
- ♦ to create openings for helicopter landing sites during fire suppression or other emergencies;
- ♦ to maintain or enhance fish or wildlife habitats;
- ♦ to improve the visual resources by opening scenic vistas;
- ♦ to provide guy line (a stationary wire line used to brace a spar pole or boom) or tailhold trees (a tree at the edge of a logging unit that anchors a

block through which a logging cable passes) where needed to facilitate logging on adjacent landowner's property;

- ♦ to aid construction of new structures, such as roads, trails, power lines, communication facilities, administrative facilities, recreation facilities; and
- ♦ to eliminate interference with the operation of microwave and radar relay stations.

Timber sale stipulations that encourage use of woody material (within environmental and economic constraints) would be incorporated into sale contracts.

## Site Preparation

Site preparation procedures would be used to prepare newly harvested and inadequately stocked areas for the planting of new trees. Four types of site preparation treatments would be used: prescribed burning, herbicide application, mechanical, and manual techniques. The BLM's 1992 Record of Decision, *Western Oregon Program, Management of Competing Vegetation*, and Oregon Manual Supplement H-5420-1 would be followed in selecting site preparation treatments, using an integrated vegetation management approach. (See Appendix 1-C in the draft for the key elements of the Record of Decision.) Emphasis would be placed on those techniques that have proved most effective in assuring seedling survival and growth. To the extent compatible with that emphasis, duff and litter would be retained.

Prescribed burning (piles, underburns, or broadcast burns) would occur when atmospheric conditions favor dispersal of smoke away from sensitive areas. This method is consistent with the Oregon Smoke Management Plan and is implemented through a voluntary co-operative smoke management program in Klamath County. Other considerations in the design and timing of burns would include expected effects on soils and wildlife habitat, effectiveness in the reduction of fire hazards, usefulness in site preparation, and risk of an escaped fire.

Prescribed fire would be avoided on highly sensitive soils (those soils recognized as unusually erodible, nutrient deficient, or low in organic matter) in most instances. Any burning on such soils, if considered essential to obtain adequate reforestation, would be accomplished under carefully prepared prescriptions designed to minimize detrimental effects on the physical and/or chemical properties of the soil. On other soils, prescriptions would be designed to protect beneficial soil properties and result in moderate- and



## Chapter 2 - Description of the Alternatives

low-intensity prescribed fires. Standard operating procedures to be used for prescribed fire are further delineated in the Lakeview District underburning environmental assessment, as well as the BLM's 1992 Record of Decision, *Western Oregon Program, Management of Competing Vegetation* (See Appendix 1-C and Appendix 2-A in the draft).

Vegetation control techniques reduce competition for light, moisture, and soil nutrients during the tree seedling establishment period. These techniques include paper mulches (paper squares placed around seedlings to suppress grasses), manual grubbing (hoeing grass away from seedlings), and cutting brush. Where considered the most appropriate treatment, herbicides would be used to control grasses, forbs, brush, and noncommercial tree species and to increase the rate of seedling survival. Application and monitoring the effects of herbicide use would be done in accordance with the BLM's 1992 Record of Decision, *Western Oregon Program, Management of Competing Vegetation*.

Where needed, sites would be prepared for tree planting (reforestation) by manual site preparation (brush pulling or cutting, or hand piling slash for burning) and/or mechanical site preparation (putting slash, brush, and unmerchantable stems in piles or rows, also known as piling and windrowing). Track-type tractors equipped with a brush blade would normally be used; however, their use would be restricted to suitable soil types and slopes less than 35 percent.

Alternative equipment or techniques for site preparation or slash treatment, such as excavators to pile slash or low ground pressure chippers, could be used to minimize compaction. Compacted areas would be tilled by properly designed equipment whenever feasible. See Appendix 2-A in the draft for more information.

## Brush and Hardwood Conversion

Lands identified as available for timber production, but currently growing primarily brush or hardwoods, would be converted to appropriate conifer species, unless the hardwoods would produce a higher net monetary return than conifers. Conversion could include harvest of existing merchantable trees, slashing of nonmerchantable trees, and other site preparation techniques as appropriate.

## Planting

To achieve adequate reforestation as promptly as practical following timber harvest, harvested areas would be planted with indigenous commercial

coniferous species (for example, Douglas fir, ponderosa pine, shasta red fir, etc.). Generally this would be done within one year of the completion of harvesting and site preparation. Harvested areas with sufficient understory would not need to be replanted. Identified root disease centers would be planted with indigenous disease resistant tree species, where such trees are available (see Appendix 2-C in the draft).

As part of the planting operation, hand scalping (clearing a small area before planting a seedling) of grasses and herbaceous vegetation would be done where needed to reduce vegetative competition to planted seedlings. Placement of paper mulches over the seedlings after planting would be an alternate treatment in such areas. Natural regeneration would be encouraged where appropriate.

Target stocking levels cannot always be achieved by the initial planting. Post-treatment reforestation surveys would be conducted to determine the rate of survival and the timing of replanting, or inter-planting, to meet desired stocking standards.

## Plantation Protection

Shade cards could be used to screen seedlings from direct sunlight and associated heat damage and desiccation. Treatments to reduce damage from animals (such as deer, elk, rabbits, pocket gophers, and porcupines) include, but are not limited to, tubing, netting, bud caps, trapping, fencing, underground baiting of pocket gophers, shooting porcupines, and habitat control by vegetation manipulation.

## Plantation Maintenance and Release

On dry sites, grasses, forbs, and shrubs are strong competitors for water. Elsewhere, shrubs and/or hardwoods compete for essential light and water during the dry summer. With reduced competition, conifers quickly grow beyond the point where they can be overtopped and further suppressed by surrounding vegetation. When this growth situation is achieved, there is no need to further control competing vegetation.

Maintenance treatments promote the establishment and survival of conifer seedlings. These treatments include paper mulching, shading, animal damage control measures, and vegetation control.

Release treatments reduce competition for light, moisture, and nutrients between shrubs, grasses, and existing conifer seedlings and promote dominance and growth of established conifer trees. These treatments include manual or mechanical brush

pulling or cutting, grubbing of grass and herbaceous vegetation, repeated controlled grazing of competing vegetation by domestic livestock, or herbicide application. An integrated vegetation management approach would be used in selection of maintenance and release treatments in conformance with the BLM's 1992 Record of Decision, *Western Oregon Program, Management of Competing Vegetation*.

Herbicides would be used to control competing vegetation when analysis shows their use to be the most appropriate treatment.

## Other Practices

Pre-commercial stands would be thinned to concentrate available nutrients, moisture, and light on a predetermined number of residual trees. The residual trees would be released from competition and left in a "free-to-grow" condition. Fertilization would be done on sites where significant gains in soil productivity and timber yield could be expected.

A tree improvement program would be developed to provide genetically-selected seed from local parents (see Appendix 2-C in the draft).

The Klamath Falls Resource Area has the opportunity to sell numerous minor forest products. The sale of such minor forest products as firewood, burls, mushrooms, Christmas trees, and boughs would be made consistent with other land use allocations. Activity plans and associated environmental assessments or categorical exclusions would be developed for minor forest product sales.

Fire hazard reduction measures (such as scattering or piling slash, and chipping) would be incorporated into timber sale and land treatment contracts. This would limit increases in fuel hazard while protecting site productivity and biodiversity.

## Special Status (Including Threatened and Endangered) Species Habitats

### General Threatened and Endangered Species Habitats

Habitats of federally listed or proposed threatened or endangered species would be monitored and managed as required by law. Prior to any vegetation or ground manipulation, or any disposal of BLM-administered

land, a review of the affected site(s) or tract(s) would be conducted for such plants and animals. The alternatives do not assume that required levels of conservation of listed or proposed species are known unless there was a recovery plan in effect before the alternatives were formulated. Thus, for instance, some alternatives provide no specific allocation of lands for conservation of northern spotted owls, although most alternatives include allocations that provide some level of protection from disturbance by management actions for northern spotted owl sites.

Protection of populations of special status plant species (as defined within each alternative) would consist of a physical buffer from those management actions adequate to eliminate all direct impacts on the population, including modification of the microhabitat that supports the occurrence of that species on the site.

If a project might affect any federal threatened or endangered species or its critical habitat, effort would be made to modify, relocate, or abandon the project to obtain a "no effect" determination. In any case where the BLM determines that such a project cannot be altered to eliminate the potential effect, and abandonment of the project is not considered appropriate, consultation with the U.S. Fish and Wildlife Service would be initiated as required by section 7 of the Endangered Species Act.

Systematic inventories and studies would be conducted on special status species where information is needed.

See Table 2-2 in the draft has for a comparison of management actions by alternative.

## Specific Threatened and Endangered Species Habitats

Known and potential habitat sites identified in the *Pacific Bald Eagle Recovery Plan* (U.S. Fish and Wildlife Service 1986) would be protected. All management actions will be consistent with the recovery plan. A habitat management plan for bald eagle nest sites in the Klamath Falls Resource Area would be written and implemented, incorporating those management actions identified in the *Working Implementation Plan for Bald Eagle Recovery in Oregon and Washington* (OR/WA Interagency Wildlife Committee 1990) for which the BLM is responsible. Management activity would be restricted within 1/4 mile of bald and golden eagle nest sites between January 1 and August 15. The BLM would coordinate with the Oregon Department of Fish and Wildlife to maintain optimum fish populations in lakes where

## Chapter 2 - Description of the Alternatives

bald eagle foraging occurs (this may include chemical treatments with compounds, such as Rotenone).

All management actions will be consistent with the *Pacific Coast Recovery Plan for Peregrine Falcons* (U.S. Fish and Wildlife Service 1982). The BLM would cooperate with the Oregon Department of Fish and Wildlife to reintroduce peregrine falcons into the Klamath River Canyon within the life of this plan. A western sage grouse inventory system would be established in cooperation with the Oregon Department of Fish and Wildlife. Lek (breeding) sites and other important habitats, such as nesting, brood rearing, and wintering areas would be inventoried and managed for grouse. Removal of large tracts of sagebrush in and near important sage grouse use areas would be prohibited. Brood rearing habitat would be managed for preferred forage species. Nesting habitat would be managed for structural diversity.

An inventory of Townsend's big-eared bats would be conducted in all potential habitat. To optimize big-eared bat populations, detrimental human disturbance would be minimized in habitat used by the bat. As opportunities arise, private lands with habitat that support big-eared bat populations or have the potential for use by the bat would be obtained through exchange or other mutual agreement.

Inventories would be conducted for special status reptiles and amphibians that are known or suspected to occur in the planning area. Inventory and documentation of non-special status reptiles and amphibians would also take place during this time.

Table 2-2 in the draft had a comparison of management actions by alternative.

## Wildlife Habitats

### General Fish and Wildlife Habitats

Except where public safety is a concern, snags would be retained on lands not allocated to timber production at 100 percent of optimum population potential for cavity nesters. In timber harvest units the percentage of optimum population potential will vary by alternative. Where relevant to meeting cavity nester objectives, some green trees on lands not allocated to timber production would be girdled or topped (having the top cut or blasted) to create snags. Timber sale contracts would encourage retention of all snags and non-merchantable trees that could be left safely in timber harvest areas. In alternatives providing for retention

of wildlife trees that could be merchantable in timber sale areas, the following guidelines would be used:

- ◆ Leave all soft snags except where unacceptable for safety, logging system, or burning considerations.
- ◆ Leave scattered hard snags and green trees, both to provide the current needs of hard-snag dependent species and to serve as a source of future soft snags. Where available, green trees retained would be cull trees (see Glossary). If cull trees are not available, sound trees would be retained for this purpose. At least half of reserved wildlife trees would be future snags (green culls, or sound trees).

Nonmerchantable **dead and down woody material** would be retained in harvested areas, to the extent compatible with reforestation objectives and fire hazard reduction standards. Gross yarding would be planned only where needed for reforestation or fire hazard reduction. Salvage of dead and down material would be conducted only where an adequate amount of such material would be retained to provide sufficient habitat to maintain populations of small animals.

Wherever practical, new roads would avoid areas with high wildlife values. Spur roads not needed for continued timber management would be closed after completion of logging (replanting would be allowed before closure).

Pre-commercial thinning projects would be designed to maintain existing game trails free of slash accumulations that impede big game movement.

Table 2-3 in the draft had a comparison of management actions by alternative.

Special habitats, such as lakes, talus slopes, meadows, and wetlands (see Table 2-4 in the draft) would be managed to protect their primary habitat values; however, rock quarries could be developed on cliffs or talus slopes not occupied by special status species. Development and rehabilitation of rock quarries would consider wildlife values. Actions that would benefit wildlife include: constructing cavities for raptors and other species in quarry walls during development, or in abandoned quarries; and piling large boulders at the base of slopes or in waste areas to create cavities for mammals.

A general inventory of reptiles and amphibians would be conducted in portions of the planning area where they are suspected to occur.

When practical, timber sale contracts would require removal of debris which obstructs fish passage or has the potential to degrade a stream channel. All other large woody debris and snags in and adjacent to fishery streams would be retained. Stream crossing structures (such as bridges and culverts) would be installed in proper fashion so fish passage would not be impeded.

See the Water Quality section for riparian management actions that relate to fish and wildlife habitat.

## **Specific Fish and Wildlife Habitats**

Cooperation would occur with the Oregon Department of Fish and Wildlife on any wildlife research, inventory, or monitoring conducted on Klamath Falls Resource Area lands, as well as for their assistance in developing an educational program to increase public awareness of wildlife (for example Watchable Wildlife and Fish and Wildlife 2000).

The existing animal damage control program would continue in accordance with the existing memorandum of understanding with the Animal and Plant Health Inspection Service and existing National Environmental Policy Act documentation. This includes control for predation on wildlife, livestock, crops, timber, and conifer seedlings.

Permanently closed roads would be ripped and planted with tree seedlings, or seeded with grasses and/or legumes after completion of timber harvest activities.

Management of trout habitat along streambanks and adjacent upland habitats would include a continual supply of large woody debris for recruitment into the stream. Suitable boulders, cull logs, and rootwads would be stockpiled in designated areas during normal work operations for future habitat improvement projects (see Table 2-5 in the draft). A management plan would be developed for the Jenny Creek watershed in conjunction with other involved agencies and private land owners. The Medford District Resource Management Plan contains more information on the Jenny Creek watershed. The coordinated resource management plan for Spencer Creek would continue to be implemented. The Oregon Department of Fish and Wildlife and Oregon Department of Fish and Wildlife-approved volunteer groups would be encouraged to stock suitable streams or ponds that are below carrying capacity or above barriers with approved brood stock and/or juvenile trout. Structures

would be installed in streams that are lacking sufficient fish habitat (structures to improve pool/riffle ratio and flow patterns would be preferred).

Ridgetops that could be part of heavily used migration routes by raptors would be inventoried and monitored.

Annual systematic nest surveys would be conducted for sandhill cranes and waterfowl to determine reproduction and success. Islands, nest platforms, and other artificial nest structures would be constructed to increase sandhill crane and waterfowl nesting potential. Where necessary, water rights would be pursued and obtained for important waterfowl production areas and wildlife springs. The 2,300 acres of seasonal wetlands in the planning area would be maintained or improved for waterfowl habitat (specifically to increase the use for nesting, brood rearing, loafing, and migrating).

Guzzlers (artificial structures that collect rain water and then regulate the flow to a drinking basin) would be installed in identified areas, usually in cooperation with the Oregon Department of Fish and Wildlife, for the benefit of upland gamebirds. Red-legged partridge, chukar, pheasant, and turkey would continue to be introduced in the planning area in cooperation with the Oregon Department of Fish and Wildlife. Monitoring and/or inventory of the game bird populations would be conducted in cooperation with the Oregon Department of Fish and Wildlife to determine their success. Clumps of mature conifers would be maintained on major ridges to provide winter habitat for grouse. Turkey habitat would be improved through projects such as rehabilitating and improving meadows, protecting oak and hardwood stands, planting and possibly fencing small plots with high yield grains and grasses, and protecting and buffering turkey roost sites.

In Roosevelt and Rocky Mountain elk habitat on the west side, clearcuts would be limited to 40 acres, uneven-age management would be used when appropriate, harvest activities would be restricted around elk calving areas, wet meadows would be protected, and hiding cover would be maintained in drainages. West side spring, summer, and fall range for mule deer and Columbian black-tailed deer would be managed as stated for elk.

West side critical deer winter range would be maintained or improved through a variety of habitat practices including rejuvenating brush field, obtaining private lands through exchanges or other mutual



## Chapter 2 - Description of the Alternatives

agreements, planting perennial grasses, improving livestock management systems, and maintaining cover. Deer habitat on the east side would be managed to maintain or improve transition and critical winter range through vegetation manipulation projects, water developments, riparian areas management, and prescribed burning. Rocky Mountain elk on the east side would also benefit from management of deer habitat.

## Special Areas

Some candidate areas of critical environmental concern were dropped from areas of critical environmental concern consideration through interdisciplinary team analysis, because they did not meet BLM eligibility criteria (see potential areas of critical environmental concern in the Glossary for a description of these criteria). Management of these areas would vary by alternative (see Appendix 2-D in the draft).

See Appendix H for proposed management of potential areas of critical environmental concerns and other areas of special interest. Management plans would be developed with participation from appropriate federal and state agencies and local user groups.

## Recreation

The majority of BLM-administered lands in the Klamath Falls Resource Area would be designated as an extensive recreation management area (see Glossary). Consistent with BLM's nationwide Recreation 2000 plan, lands would be managed for a diversity of resources. These lands would continue to be available for dispersed recreation activities, including hunting, fishing, sightseeing, horseback riding, snowmobiling, and hiking when consistent with forest and range activities. Emphasis would be on providing vehicle-accessible opportunities close to population centers. All BLM-administered lands would be open to recreational mineral collection (casual use) unless the area was subject to prior rights, such as mining claims. The following existing recreation facilities and special recreation management areas would be maintained and managed (some in partnership with other agencies or groups) as indicated:

- ◆ Gerber Recreation Site - 50 existing camping units would be managed to accommodate overnight, day use, and mobility impaired visitors; boat

ramps; several nearby semi-developed camp sites would be managed to provide primitive camping and day use.

- ◆ Miller Creek Trail - ¼-mile long, for hiking and horseback use.
  - ◆ Pacific Crest National Scenic Trail Special Recreation Management Area - ½-mile long in the Klamath Falls Resource Area, for hiking and horseback use. Maintenance for the Klamath Falls Resource Area section of the trail would continue to be coordinated by the Medford District BLM. Management of the trail would continue to follow the existing Pacific Crest National Scenic Trail Comprehensive Plan.
  - ◆ Klamath River Complex Special Recreation Management Area - 7,400 acres would be managed to emphasize whitewater boating, fishing, and camping along the upper Klamath River. The rafting put-in and stateline take-out would be improved and expanded. Scouting trails for the Caldera and Hell's Corner rapids would be improved. Topsy recreation site with 15 existing camping units would be managed for overnight and day use visitors; boat ramp; and several primitive camping sites would continue to be managed and maintained. The BLM would continue to follow the cooperative management agreement with the Pacific Power and Light Company for coordinated recreation trail and facility development. Topsy Road would be nominated for the National Back Country Byway System.
- The Spencer Creek area would continue to be managed under the Spencer Creek coordinated resource management plan.
- The use of off-highway vehicles on BLM-administered lands will be regulated in accordance with the authority and requirements of Executive Orders 11644 and 11989 and regulations contained in 43 Code of Federal Regulations 8340. They require that off-highway vehicle use not cause significant adverse effects to resource values, conflicts between visitors be minimized, public hazards be identified, and public safety be promoted. Some of the existing off-highway vehicle designations would remain unchanged from current management. Areas are designated as open, closed, or limited for off-highway vehicle use (see Glossary for definitions). The unchanged designations include:
- ◆ Mountain Lakes Wilderness Study Area - 334 acres limited (to existing trails only); and
  - ◆ Pacific Crest National Scenic Trail - 3 acres closed.

The BLM's recreation program would increase emphasis on interpretive and informational signs and maps in support of state and local strategies for encouraging tourism. Additional informational, educational, and recreational opportunities would be provided to enhance visitors' experiences, and increase their knowledge of the use and protection of natural resources, the BLM's land management role, and the responsibility of visitors to public lands. These opportunities could include development of nature or multi-purpose trails in the Klamath River Complex Special Recreation Management Area; development of overnight camping or day-use facilities (hang gliding, target shooting) in the Stukel Mountain area; and development of interpretive sites, brochures, and facilities for wildlife, historic or cultural sites, or other natural resources in the Klamath River Complex Special Recreation Management Area and Gerber Block area. Portal and interpretive signs would be provided along major public routes. The Modoc Trail would be nominated for the National Back Country Byway System. See Table 2-1 and Table 2-7 in the draft for recreation sites, trails, and off-highway closures. The BLM would continue to cooperate with local user groups to provide for coordinated recreation planning, maintenance of facilities, and acquisition of recreation funding.

As opportunities arise, easements and/or land would be obtained through exchange or other mutual agreements to enhance future recreation management and opportunities. Swan Lake Rim; and Hamaker, Stukel, Bryant, and Hogback mountain areas are among the areas that would be considered for this action.

## Wild and Scenic Rivers

The BLM's interim wild and scenic river protective management policy will be in effect on all BLM-administered land within ¼ mile of the normal high water mark on each side of those rivers determined in this Resource Management Plan/Environmental Impact Statement to be suitable for designation under the National Wild and Scenic Rivers Act, pending Congressional resolution of the designation issue. Interim protective management in the upper Klamath River Canyon would be in effect from rim to rim or ¼ mile from the normal high water mark on each side of the river, whichever is greater. Under this interim protective management, the outstandingly remarkable value(s) that resulted in the river's eligibility would be protected or enhanced and no actions that would adversely affect those values would be authorized on BLM-administered lands within the protected corridor.

The BLM's interim protective management guidelines would not directly affect private lands. Management guidelines and standards for designated rivers, described in Appendix 2-E in the draft, also apply to river areas under interim protective management.

Interim protective management for rivers determined to be suitable depends on the river's classification (recreational, scenic, or wild). On recreational river segments, timber harvest would be prohibited in the riparian management area (see Glossary) along the segment. Water quality would be maintained or improved. Hydroelectric power facilities would not be permitted. Mining would be permitted, subject to existing regulations. Roads and trails could be constructed. Agricultural practices and grazing would be allowed to continue at current levels. Recreation facilities within sight of the river would be allowed. Public use would be encouraged, although public use and access could be regulated. New rights-of-way would be discouraged. Motorized travel would generally be allowed on existing roads.

The corridors along scenic river segments would be managed under visual resource management Class II objectives (see the Visual Resources section for these objectives). Timber harvest would be prohibited in the riparian management area. Water quality would be maintained or improved. Hydroelectric power facilities would not be permitted. Mining would be permitted, subject to existing regulations. Inconspicuous roads and trails could be constructed. Agricultural practices and grazing would be allowed to continue at current levels. Recreation facilities would be allowed if they were screened from the river. Public use would be encouraged, although public use and access could be regulated. New rights-of-way would be discouraged. Motorized travel would be allowed, prohibited, or restricted as necessary.

No river segments in the planning area meet the criteria for a wild classification; therefore, guidelines for wild rivers are not discussed here. Detailed management guidelines and standards for rivers designated or eligible for designation under the National Wild and Scenic Rivers Act are described in Appendix 2-E in the draft.

## Wilderness Study Areas

The BLM's wilderness interim management policy will be followed for the Mountain Lakes Wilderness Study Area pending Congressional action to either designate or release this area. No actions that would diminish the suitability of the lands for wilderness management would be authorized until that time.



The alternatives address options for management of this area if the Congress decides not to designate it as wilderness. If the Congress does designate it as wilderness, that designation would determine how the area would be managed.

## Visual Resources

Visual resource management classes and objectives provide different levels of protection, which are set forth as follows:

- ♦ **Class I.** The objective is to preserve the existing character of the landscape. The level of change to the characteristic landscape should be minimal and must not attract attention. This class provides for natural ecological changes; however, it does not preclude very limited management activity.
- ♦ **Class II.** The objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- ♦ **Class III.** The objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- ♦ **Class IV.** The objective is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance and repeating the basic elements.

To evaluate specific proposed projects, a contrast rating system is used to measure the degree of contrast between the proposed activity and the existing landscape. This score is compared with allowable levels of contrast for the appropriate management class. The comparison will determine if

mitigation is required to reduce visual impacts. To meet Visual Resource Management Class I objectives timber harvests and most other management activities are not allowed. Landscape alterations would be permitted only for public safety or enhancement of scenic values.

Timber management to meet Visual Resource Management Class II objectives would employ single tree selection, uneven-age harvest, retention of shelterwood overstory trees, or small clearcuts (which approximate group selection management) in areas observable from key viewpoints. Larger clearcuts would be fully screened. Conifer harvest that normally requires helicopter removal, roads, or yarding corridors would not be apparent to the viewer. Shelterwood retention would usually involve deferring harvest of 100- to 120-square feet of basal area (see Glossary) per acre on the west side and 80- to 100-square feet of basal area per acre on the east side and not completing overstory removal until the understory meets visual standards (usually about age 40).

To permit screening of clearcuts and time for regrowth between sequential entries, clearcut harvests would not remove more than approximately 7 percent of any observable Visual Resource Management Class II area in a given decade. Other management activities would follow Visual Resource Management Class II disturbance guidelines.

Management approaches to meet Visual Resource Management Class III objectives would employ either short-term retention of shelterwood overstory trees, or the use of clearcuts which have less than ten acres observable from key viewpoints and which do not disturb more than ten percent of the observable Visual Resource Management Class III area in any decade. Where possible, clearcuts or surface disturbing activities would be screened from the observer by uncut areas, shelterwood units, or young stands.

No specific visual management restrictions would apply to lands managed for Visual Resource Management Class IV objectives, but mitigation of visual impacts would be incorporated where consistent with efficient timber harvest or other management activities.

See Table 2-1 for acreage of Visual Resource Management class management by alternative.

## Cultural Resources

The BLM would continue to identify localities with cultural resource values (including archaeological

sites, Native American traditional use areas, and historic sites) and manage them for their public and scientific uses. This objective would largely be accomplished through implementation of 36 Code of Federal Regulations 800 which ensures that authorized land use actions do not inadvertently harm or destroy federal or non-federal cultural resources. To achieve this goal, Class III cultural resource surveys would be conducted on all lands to be affected by earth disturbing activities, such as timber harvest, road construction, range land improvements, and recreation site development. See Appendix 3-F in the draft for a discussion on the cultural resource survey classification system.

The Modoc Trail would be nominated for the National Back Country Byway System.

Paleontological resources would continue to be protected through implementation of the 1906 Antiquities Act which requires permits for the removal of significant paleontological resources.

Affirmative measures would be taken to protect and enhance cultural resource values largely as a result of the 1988 Archaeological Resources Protection Act amendments and the BLM's Adventures in the Past initiative. The Archaeological Resources Protection Act amendments direct federal agencies to inventory and evaluate their cultural resources and to develop public awareness programs to explain the significance of those resources. Adventures in the Past helps attain those goals by enhancing public enjoyment and awareness of cultural resources on BLM-administered lands. One specific affirmative measure would be that law enforcement personnel would conduct systematic monitoring of endangered cultural resource sites. Other specific affirmative measures vary by alternative.

## **Land Tenure**

Generally, adjustments to land tenure (land exchanges, transfers, or sales) are guided by a three-zone concept using the following standards:

- ◆ **Zone 1.** Lands currently identified as having natural resource values with high public interest, as well as other efficiently-managed lands. The natural resource values may require protection by federal law, Executive Order, or Bureau policy. These lands may have other values or natural systems which merit long-term public ownership. Zone 1 lands do not meet the criteria for sale under section 203(a) of the Federal Land Policy and Management Act of 1976 and generally would be retained in public ownership.
- ◆ **Zone 2.** Zone 2 lands meet criteria for exchange because they form discontinuous ownership patterns, are relatively inefficient to manage, and may not be accessible to the general public. These BLM-administered lands may be blocked up in exchange for other lands in zones 2 or 3, transferred to other public agencies, or given some form of cooperative management. Zone 2 lands would not be sold under section 203(a) of the Federal Land Policy and Management Act.
- ◆ **Zone 3.** Zone 3 lands are scattered and isolated, with no known unique natural resource values. These lands would be available for exchanges for private inholdings in zone 1 (high priority) or zone 2 (moderate priority). They are also potentially suitable for disposal through sale under section 203(a) of the Federal Land Policy and Management Act if important recreation, wildlife, watershed, threatened or endangered species habitat, and/or cultural values are not identified during disposal clearance reviews and no viable exchange proposals for them can be identified. Zone 3 lands would also be available for transfer to another agency or to local governments as needed to accommodate community expansion and other public purposes.

Lands in the three zones remain consistent for all alternatives (see Map 2-1 in the draft). Zone 3 lands are identified in Appendix 2-F in the draft.

All land tenure adjustments will consider the effect on mineral estate. If the lands are not known to have mineral potential, the mineral interest will normally be transferred simultaneously with the surface.

The land ownership adjustment criteria identified in Appendix 2-F in the draft will be considered in land reports and environmental assessments prepared for specific ownership adjustment proposals. Transfer of land to other public agencies would be considered where consistent with public land management policy and where improved management efficiency would result. Minor adjustments involving exchanges or sales could be made based on site-specific application of the land ownership adjustment criteria.

**Land Exchanges.** Exchanges would be made only to enhance public resource values and/or improve land patterns and management capabilities of both private and BLM-administered lands within the planning area by consolidating ownership and reducing the potential for land use conflict. Land to be obtained through exchange or other mutual agreement by the BLM generally must:

## Chapter 2 - Description of the Alternatives

- ♦ facilitate access to public lands and resources;
- ♦ maintain or enhance important public values and uses;
- ♦ maintain or enhance local social and economic values in public ownership;
- ♦ facilitate implementation of other aspects of the approved Klamath Falls Resource Management Plan/Environmental Impact Statement.

Private lands located within zone 1 or 2 boundaries appear to meet the above criteria for public ownership, pending site-specific environmental analysis.

**Sales.** Sales of BLM-administered lands are conducted under the authority of section 203 of Federal Land Policy and Management Act which requires that one of the following conditions exist before land is offered for sale:

- ♦ Such tract, because of its location or other characteristics, is difficult and uneconomic to manage as part of the public lands and is not suitable for management by another federal department or agency;
- ♦ Such tract was acquired for a specific purpose and the tract is no longer required for that or any other federal purpose; or
- ♦ Disposal of such tract will serve important public objectives, including, but not limited to, expansion of communities and economic development which cannot be achieved prudently or feasibly on land other than public land and which outweigh other public objectives and values, including, but not limited to, recreation and scenic values, which would be served by maintaining such tract in federal ownership.

## Hydroelectric or Alternative Energy Projects

Management direction would vary by alternative (see also the Rights-of-Way section).

## Rights-of-Way

BLM-administered lands would continue to be available for needed rights-of-way, where consistent with local comprehensive plans and Oregon's statewide planning goals and rules. Utility/transportation routes (for electric transmission, as distinguished from

electricity distribution or facilities; pipelines 10 inches in diameter or larger; significant canals, ditches and conduits; railroads; communication lines for interstate use; federal and state highways; and major county roads) would be confined to existing and other previously designated corridors, which are shown on Map 2-2 in the draft. Communication facilities would be allowed on existing communication sites, also shown on Map 2-2 in the draft.

Corridor widths vary depending on the number of parallel facilities within the corridor, but are a minimum of 2,000 feet (1,000 feet on either side of existing center lines) unless restricted by exclusion areas described in the following paragraph. Applicants would be encouraged to locate new facilities (including communication sites) adjacent to existing facilities to the extent technically and economically feasible. New facilities would be limited to the minimum acreage necessary for operation and maintenance.

All research natural areas, visual resource management Class I areas (see the Visual Resources section), and the Mountain Lakes Wilderness Study Area would be considered right-of-way exclusion areas (where future rights-of-way would be granted only when mandated by law).

All existing and proposed recreation sites, areas of critical environmental concern other than research natural areas; rivers suitable for scenic status; cultural resource sites; and areas identified as having threatened or endangered, proposed, candidate (category 1 or 2), state listed or Bureau sensitive plant or animal species; deer winter range and other important wildlife habitat (such as nesting, calving, and breeding areas) would be avoidance areas (where future rights-of-way may be granted only when no feasible alternative route or designated right-of-way corridor is available). Areas identified for Visual Resource Management Class II management would be avoided or appropriate mitigation measures taken.

No BLM permits, leases, agreements, or rights-of-way would directly result from this plan, except possibly for the Salt Caves hydroelectric project proposal under Alternatives A and B. Any potential BLM decision for areal or linear rights-of-way or non-mineral energy development will be guided by applicable laws, regulations, and procedures and include appropriate environmental analyses. Any application will first be screened for general consistency with the approved plan. Proposals which are clearly prohibited by Resource Management Plan land-use allocation decisions will be rejected without further consideration. Applications which could be

permitted or conditionally permitted would be analyzed on a case-by-case basis. Such analysis could include potential Resource Management Plan amendments, if warranted. Plan amendments involve substantial public notice and involvement opportunities, incorporate appropriate levels of environmental analysis, and require interagency coordination.

## Access

The BLM obtains access to its lands by the purchase of road easements and by entering into reciprocal and cooperative road use right-of-way agreements. Easements can be grouped into three categories:

- ◆ **Permanent exclusive.** BLM controls the road and the public has rights to use the road;
- ◆ **Permanent non-exclusive.** Private land owner controls the road and BLM has permanent rights only for its permittees and licensees;
- ◆ **Temporary non-exclusive.** Private land owner controls the road and BLM only has temporary rights for its permittees and licensees.

Public access would be acquired to zone 1 lands and large blocks of zone 2 lands (see the Land Tenure section) when appropriate to manage the resources found there.

Reciprocal and cooperative road use right-of-way agreements are used because BLM-administered and private lands are generally intermingled and each party must cross the lands of the other in order to reach its own resources.

In western Oregon, this is predominantly relevant to harvesting timber. It is BLM policy to provide all prospective purchasers of BLM timber with an equal opportunity for access. Reciprocal right-of-way agreements transfer rights to use lands between the parties in the agreement, identify conditions of road and land use that are equitable and nondiscriminatory, facilitate management of the road network by the BLM and the adjacent land owners, and are binding on future land owners should the private property be sold. Most of the lands where logging road right-of-way agreements are appropriate are now covered by reciprocal agreements. The terms and conditions of a reciprocal agreement do not change unless they are modified by both parties. Laws passed after an agreement is signed may have no effect on the agreement's terms and conditions unless both parties agree to modify the agreement to include the new

law. When one party wishes to cross the lands of the other to remove timber, a road use permit (tram or logging road) is issued to the logging company. This permit, issued by the land owner to the logger, specifies the road use and maintenance conditions that must be met.

Right-of-way agreements usually do not include public access rights. When opportunities arise, an attempt would be made to negotiate public access in conjunction with existing reciprocal right-of-way agreements.

## Withdrawals

Table 2-8 in the draft shows existing withdrawals (see Glossary) which would be recommended for termination or revocation, and the rationale for such recommendations. Table 2-9 in the draft shows management by alternative for lands returning to BLM multiple use management. Lands returned to BLM multiple use management by termination or revocation of withdrawals would be managed in the same manner as surrounding or adjoining BLM-administered lands.

## Energy and Minerals

Within legal restrictions, all publicly-owned minerals would be available for exploration and development subject to regulations and standard requirements. Where it is necessary to protect important lands and resources, mineral exploration and development would be subject to additional restrictions which, in some cases, could include no leasing, no disposal of mineral materials, no surface occupancy, or seasonal or other timing restrictions. In all cases, the least restrictive limitations necessary for resource protection would be used; however, the acreage has been estimated using the most severe restrictions. Acres of mineral ownership and withdrawals have been estimated using maps and overlays, and adjusted by subtracting overlapping restrictions.

**Locatable Minerals.** Mineral exploration and development will be regulated under 43 Code of Federal Regulations 3802 and 3809 to prevent unnecessary or undue degradation. Processing a notice (operations of 5 acres or less outside of special management areas) is not a federal action that requires compliance with the National Environmental Policy Act. Projects disturbing more than 5 acres require the submittal and approval of a plan of operations and are subject to National Environmental Policy



Act compliance. All surface disturbance from operations, whether conducted under a notice or an approved plan of operations, would be reclaimed. See Table 2-10 in the draft for locatable mineral restrictions by alternative.

The standards that govern activities conducted under notices and plans are shown in Appendix 2-G in the draft.

**Leasable Minerals.** Oil and gas leasing and development will be regulated under 43 Code of Federal Regulations 3100, and geothermal resources leasing and development will be regulated under 43 Code of Federal Regulations 3200 to ensure that all operations are conducted with adequate consideration given to environmental and resource conservation concerns (see table 2-11 in the draft for lease restrictions by alternative). In order to protect special resource values and special investments, leasing would be subject to the lease notices and lease stipulations shown in Appendix 2-G in the draft. Although the specific wording of the notices and stipulations may be adjusted at the time of leasing, the protection standards described in the appendix would be maintained.

**Salable Minerals.** Mineral material disposal will be regulated under 43 Code of Federal Regulations 3600 to ensure that all operations are conducted with adequate consideration given to environmental and resource conservation concerns (see Table 2-12 in the draft for salable mineral restrictions by alternative). Standards to protect resource values and ensure reclamation are shown in Appendix 2-G in the draft.

**Reserved Mineral Estate.** The reserved federal mineral estate (also referred to as federal subsurface mineral estate) would continue to be open for mineral development except where it is legally unavailable or where it is necessary to protect special resource values.

**Withdrawal Revocations.** Across all the alternatives, withdrawals totalling 8,000 acres would be revoked (see Tables 2-8 and 2-9 in the draft). These lands would then be available for mineral exploration and development, in some cases subject to restrictions that might be necessary to protect special values.

## Rural Interface Areas

Management direction would vary by alternative. See Table 2-1 for management actions by alternative.

## Livestock Grazing

Administration of the grazing program will continue to be governed by sections 3 and 15 of the 1934 Taylor Grazing Act (see the Chapter 3 Livestock Grazing section). Section 3 of the Act governs the issuance of grazing permits for established grazing districts. In the Klamath Falls Resource Area, the Gerber block is such an established grazing district. All BLM-administered lands outside of established grazing districts are governed under section 15 of the Act. This would include all grazing allotments on the west side of the planning area and some allotments on the east side of the planning area.

Implementation of the range land management program for the Klamath Falls Resource Area would be based on the collection of vegetative monitoring data, as outlined in the 1988 Oregon Rangeland Monitoring Handbook (H-1734-2). Adjustments in grazing use (including, but not limited to, changes in season-of-use, kinds and classes of livestock, numbers of animals, grazing capacity, management facilities needed) would be based on and supported by the ongoing range land studies performed in accordance with the above guidance. Additional and future guidance would be used as applicable.

The results of these range land studies would then be reviewed by an interdisciplinary team of resource specialists through an allotment evaluation process. Recommendations for future management actions (in consultation, coordination, and cooperation with the affected groups and interests) would then be reviewed, modified, or approved by the authorized officer (Area Manager). When needed, changes to permitted use would be implemented through written agreements. Following the allotment evaluation process, allotment management plans would be completed or revised to implement other management changes.

The monitoring of priority I and M allotments (see the Chapter 3 Livestock Grazing section) would continue as a requirement of the livestock grazing program to ascertain the affects of future grazing use. Future long-term adjustments in grazing use would be made through systematic evaluation and re-evaluation of the ongoing monitoring data. A variety of grazing systems and completed allotment management plans for all I and M category allotments would be implemented.

Short-duration, high-intensity grazing systems on section 3 lands in the Gerber Block would continue to be developed to improve riparian and wetland resources. Land exchanges on section 15 lands

would be pursued to block up larger areas of public land to improve and accelerate meeting multiple use management objectives. A new grazing allotment would be created for the Klamath River Canyon. This allotment would extend from rim to rim of the canyon from just south of the J.C. Boyle Powerhouse to the Oregon-California state line. The allotment would consist of approximately 6,600 acres: 75 percent BLM-administered land (42 percent Oregon & California land, and 33 percent public domain land), 2 percent State of Oregon land, and 23 percent private lands. Some of this land is in the existing Edge Creek allotment (allotment #0102). The new allotment would allow better control and distribution of livestock grazing in the canyon, which would benefit existing riparian and wetland vegetative communities. Range land improvements would be constructed as needed to support achievement of management objectives. These improvements would include, but are not limited to, fence and reservoir construction, spring developments, vegetation manipulation, and prescribed burns. See Appendix 2-H in the draft for proposed changes by alternative for each allotment.

A pro-active noxious weed control program would continue to be developed and implemented within the planning area. Development and implementation of this plan would be in coordination with Klamath County (see also the Noxious Weed Control section).

## **Wild Horses**

The Pokegama Wild Horse Herd would be managed for a population of 30 to 50 animals. Yearly reconnaissance flights would be conducted to inventory the horses, with a ground survey every 2 to 3 years to gain an accurate count of the horses. If the number of horses exceeds 50, control measures would be initiated to prevent damage to vegetation. Areas with salt licks would be established away from wildlife guzzlers (artificial structures that collect rain water and then regulate the flow to a drinking basin).

## **Roads**

Roads would be constructed and maintained to standards sufficient to serve their anticipated use. Specific construction standards (contained in BLM Manual 9113), and surfacing standards would be determined during the project planning process. Road construction would be located and scheduled to avoid mass movement of soil. Where appropriate to the anticipated intensity of use, roads would be paved or rocked to minimize sedimentation. Spur roads built

for temporary use would be rehabilitated when that use is completed. The public has access rights to BLM-administered lands when BLM controlled roads directly meet state or county roads, or when the BLM has acquired permanent exclusive easements (see the Access section) that allow public access. If required to alleviate significant resource damage, permanent or long-term road closures would be implemented, using standard analysis, public involvement, and notification procedures. Seasonal road closures could occur for wildlife, recreation, cultural, or other resource management objectives.

Reciprocal and cooperative road use right-of-way agreements are used because BLM-administered and private lands are generally intermingled and each party must cross the lands of the other in order to reach its own resources.

In western Oregon, this is predominantly relevant to harvesting timber. It is BLM policy to provide all prospective purchasers of BLM timber with an equal opportunity for access. Reciprocal right-of-way agreements transfer rights to use lands between the parties in the agreement, identify conditions of road and land use that are equitable and nondiscriminatory, facilitate management of the road network by the BLM and the adjacent landowners, and are binding on future landowners should the private property be sold. Most of the lands where logging road right-of-way agreements are appropriate are now covered by reciprocal agreements. The terms and conditions of a reciprocal agreement do not change unless they are modified by both parties. Laws passed after an agreement is signed may have no effect on the agreement's terms and conditions unless both parties agree to modify the agreement to include the new law. When one party wishes to cross the lands of the other to remove timber, a road use permit (tram or logging road) is issued to the logging company. This permit, issued by the landowner to the logger, specifies the road use and maintenance conditions that must be met.

Right-of-way agreements usually do not include public access rights. When opportunities arise, an attempt would be made to negotiate public access in conjunction with existing reciprocal right-of-way agreements.

The provisions of these agreements allow the BLM only limited discretion to control the location of roads constructed by private parties across BLM-administered lands (and vice versa). This limited discretion allows BLM to object for reasons such as excessive erosion damage, threatened and endangered species, and/or cultural sites.



## Noxious Weed Control

Treatment of noxious weeds on BLM-administered lands would not vary by alternative. Treatment would be designed to control infestations using an integrated pest management approach. Chemical, mechanical, and biological methods would be considered. Application and monitoring of the effects of herbicides would be done in accordance with the BLM's 1985 multi-state Environmental Impact Statement, *Northwest Area Noxious Weed Control Program*, as supplemented in 1987, and the related Record of Decision. (see Appendix 1-B in the draft for relevant portions of the Record of Decision.) Noxious weeds expected to be subject to control efforts are listed by control priority in Table 2-13 in the draft.

## Hazardous Materials

Treatment of hazardous materials would not vary by alternative. The transportation, storage, and handling of hazardous materials (anything that poses a substantive present or potential hazard to human health or the environment when treated improperly, stored, transported, disposed of, or otherwise managed), will be in accord with manufacturers' specifications and applicable laws, such as the Resource Conservation and Recovery Act and the Emergency Planning and Community Right-To-Know Act.

Any release, unauthorized dumping, or abandoned or inactive waste disposal site suspected of involving hazardous wastes will be reported, assessed, and treated in accordance with the District's Hazardous Materials Contingency Plan; the Federal Water Pollution Control Act; the Clean Air Act; the Comprehensive Environmental Response, Compensation, and Liability Act; and other applicable state and federal environmental laws.

## Fire

The Lakeview District's role in fire management is to remain sufficiently prepared to handle the district's suppression and prescribed fire programs and to support regional and national wildfire suppression needs.

The current wildfire suppression strategy used by the BLM is to minimize the total suppression cost and net resource value loss. The primary tactic employed by the BLM is to attack wildfire based on the level of fire danger and values at risk, using only those suppression resources sufficient for management objectives.

Emergency rehabilitation would be included as a suppression cost. Depending on values at risk, such as soil, air quality, timber, and fisheries, different suppression tactics would be used to minimize resource damage. For example, tactics could exclude the use of bulldozers on fragile soils, creation of ponds on important streams, soil disturbance near archaeological sites, or backfiring near habitats of threatened or endangered plants. Conversely, areas such as developed recreation areas, new plantations, or advanced regeneration sites have very high resource value which could dictate the use of expensive suppression tactics for maximum protection.

Emergency fire rehabilitation is frequently necessary following large, severe wildfires to prevent further site degradation and to restore the burned area to full productivity. Rehabilitation would be used to remedy adverse conditions caused by both the wildfire and the suppression tactics. Rehabilitation often includes restoration and erosion control (seeding, water bars) on bulldozer and hand lines, prompt revegetation of bare areas on erodible soils, and clearing of stream impoundments.

An integral part of wildfire control is the reduction of hazard fuels. These fuels result from timber harvest, stand improvement operations, and the unnatural accumulations of fuels that have occurred as a result of past fire suppression. Prescribed burning would be used to restore and maintain the health of fire-dependent ecosystems and to reduce the intensity of future wildfires. Wildfires will occur throughout the next decade regardless of the level in fire suppression forces. Other fuels management activities (see the Wildlife and Timber sections) would be used for site preparation, enhancement of wildlife habitat, and hazard reduction.

The overriding protection objective for the entire resource area is to prevent large, multi-day type fires.

The wildfire protection objectives as defined in the district fire management activity plan (see Table 2-14 in the draft) are as follows:

### West of Highway 97:

- ♦ **Intensive suppression.** Intensive suppression would limit the acres burned by wildfire to less than 20 acres per year (a maximum of 10 acres north of Highway 66 and a maximum of 10 acres south of Highway 66).

### East of Highway 97:

- ♦ **Intensive suppression.** Intensive suppression would minimize the area burned by wildfires in rural interface areas, such as Klamath Forest

Estates, southeastern Swan Lake Rim, Stukel Mountain, and Hogback Mountain, and would limit wildfires to less than 10 acres in those areas included in the Klamath Prescribed Fire (Underburning) Program.

- ◆ **Conditional suppression.** Conditional suppression in the juniper/grasslands would vary the allowable acres burned by wildfire based on fire intensity and the opportunity to use natural control barriers in suppression efforts.

The Gerber Block Fire Management Operational Plan currently under development provides for conditional suppression, mostly in the suitable woodlands and grasslands, but allows for selected commercial forest lands to be included if they meet fuel load criteria.

Fire use areas are those areas where prescribed fire (both planned and unplanned ignition) may be used on a rotational basis to protect, maintain, or enhance ecosystems. Previously identified fire use areas in the Klamath Falls Resource Area include two programs of prescribed underburning in the suitable commercial forest land using planned artificial ignition. Underburning is used to reduce fuels to a level where rotational fire (an average of approximately every 20 years) would be used to protect, maintain, and enhance ecosystems.

## **Management Direction for the Alternative No Action**

### **Objective**

Describes current management practices that would continue if no change is mandated through this environmental impact statement/resource management plan process. Emphasis would be on multiple use and sustained yield practices.

### **Water Quality and Riparian Zones**

#### **Water Quality**

Management direction for water resources in relation to timber harvest and roads is located in those sections and in Appendix 2-A in the draft.

**Lands West of Highway 97.** Soil erosion and sedimentation resulting from timber harvest, road construction, and other activities would be minimized to produce waters of sufficient quality to meet state and federal standards. The streambank environment would be protected; erosion and water quality degradation due to livestock concentrations on fragile soils would be minimized; and sound, uniform guidelines for all resource activities would be established for each general soil association. Recommended watershed practices in the field handbook *Recommended Watershed Practices for BLM-administered Lands in the Jackson-Klamath Planning Area* would continue to be used as guidelines for minimizing water quality degradation and reducing loss in site production (see Appendix 2-A in the draft).

The proper season of use would be determined and set to meet the physiological needs of desirable forage species on all livestock allotments. Management plans would continue to be developed and implemented for grazing allotments. See the Livestock Grazing section and Appendix 2-H in the draft for specific actions. All wet or semi-wet meadows within specified allotments of sufficient size for management would be fenced to control livestock use. Salting areas would be located on rocky or gravelly areas away from water.

**Lands East of Highway 97.** Vegetation would be managed predominantly to achieve a desired plant community and good ecosite condition, which is compatible with the soil surface factor method (see Chapter 3 for a discussion of the soil surface factor method). Grazing management, consisting primarily of rest-rotation systems, would be the primary means to manage watershed condition by providing for optimum and economical distribution of livestock and incorporation of litter into the soil.

Riparian enhancement projects would be implemented to improve water quality.

#### **Riparian Zones**

**Lands West of Highway 97.** A horizontal 100 foot average width riparian management area would be in effect on each side of Class 1 and 2 streams (see Appendix 2-B in the draft). No harvesting would be permitted in the riparian management area except to benefit wildlife, to salvage dead trees after a devastating fire, or to create yarding corridors across streams. Directional felling would be used when harvesting within a tree length of riparian management areas to protect riparian habitat, streambank stability, and

vegetation. When yarding across streams, complete suspension would be provided whenever practical. If complete suspension cannot be achieved, yarding corridors would be designated. Mechanical site preparation, fertilization (aerial application), or prescribed burning would not be allowed within 100 feet of class 1 and 2 streams.

All non-commercial conifers, nonmerchable conifers, hardwood trees, and commercial conifers that are marked for harvest within 30 feet of class 3 streams would be reserved from cutting. All trees designated for cutting that are within a tree length of the class 3 stream would be felled away from the stream. Piling within 50 feet of the stream, yarding up or down the stream bottom, scarification or ripping within 50 feet of the class 3 stream channel, and the placement of skid roads and landings within 50 feet of the stream would all be prohibited. Tractor crossings would be minimized and allowed only at approved sites. Neither fertilization (aerial application), nor prescribed burning would be allowed within 30 feet of class 3 streams.

Non-commercial conifers, nonmerchable conifers, hardwood trees, and marked commercial conifers within 20 feet of class 4 streams would be reserved from cutting. All trees designated for cutting that are within a tree length of the class 4 stream would be felled away from the stream. Yarding up or down the stream bottom, scarification, piling, or ripping within 50 feet of the stream channel, and the placement of skid roads and landings within 50 feet of the stream would be prohibited. Tractor crossings would be minimized and allowed only at approved sites. Neither fertilization (aerial application) nor prescribed burning would be allowed within 20 feet of class 4 streams.

Tractor yarding up or down the draw bottom would be avoided in class 5 streams.

Optional management guidelines for accomplishing stream management objectives are listed in Appendix 2-A in the draft.

**Lands East of Highway 97.** Riparian habitats would be managed to enhance their vegetative characteristics. Riparian habitats could be fenced to control livestock use as habitat or riparian management plans are developed. Livestock could be excluded for 3 to 5 years to allow vegetative recovery. As riparian management areas are defined and fenced, the fenced area would include the entire riparian zone. Other riparian enhancement projects to improve water quality would be implemented.

Limited use of existing skid trails and existing roads in riparian zones could be allowed to facilitate timber harvest. Logging would not be allowed in riparian zones. Streams and riparian areas have been and would continue to be protected during timber harvest (even though not called for in the Lost River Management Framework Plan) through the use of the stream class system and the associated buffers (see management actions for lands west of Highway 97).

## Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity

There is no specific existing guidance for old growth and mature forest management, except to exclude programmed timber harvest from areas that are within lands allocated to riparian buffers, bald eagle and other threatened and endangered species withdrawals, existing recreation sites, and other such areas.

On the **west side**, 140 acres reserved from programmed harvest are currently old growth, and 210 acres are mature forest. On the **east side**, 20 reserved acres are currently old growth, and 60 acres are mature forests.

## Timber

On the **west side**, the Jackson-Klamath sustained yield unit management framework plan assigned an allowable sale quantity of 33 million board feet (5.78 million cubic feet) per year for the Klamath sustained yield unit. The Klamath Falls Resource Area's portion of this, which is in Klamath County, was administratively assigned an allowable sale quantity of 19 million board feet (3.4 million cubic feet). The silvicultural regime was a two-stage shelterwood in most stands, and included treatments of site preparation, planting, release, stocking control, fertilization, and gopher control after timber harvest (see Table 2-1 for average annual treatments). On the **east side**, the Lost River Management Framework Plan set an allowable sale quantity of 1.4 million board feet (0.27 million cubic feet) per year. The silvicultural systems included individual tree selection, group selection, and three-stage shelterwood cuts, with treatments of stocking control, tree planting, and protection from animal damage in young growth stands.

On the **west side**, timber harvest practices would be conducted using the guidelines contained in the Watershed Handbook and Appendix 2-A in the draft.

Two Oregon BLM Instruction Memoranda would continue to guide protection of soils. Instruction Memoranda OR-83-662 limits the extent of soil compaction allowed in a harvested unit and Instruction Memoranda OR-83-361 addresses soils management. In addition, to maintain an acceptable level of soil productivity, the best management practices listed in Appendix 2-A in the draft would continue to be recommended and/or implemented.

Site preparation projects would be planned so no more than 30 percent of an entire drainage would be treated during a five-year period. Thinning more than 50 percent of an entire drainage at one time would not be allowed.

On the **east side**, best management practices would continue to be applied to timber harvest activities.

## **Special Status (Including Threatened and Endangered) Species Habitats**

Habitats of federally listed or proposed threatened or endangered plant and animal species would be monitored and managed, as required by law.

Prior to any vegetation or surface-disturbing management activity or disposal of BLM-administered lands, a survey of the affected area would be conducted for special status plant and animal species. If a project might affect any federally listed or proposed threatened or endangered species or its critical habitat, then the project would be modified, relocated, or abandoned. If a project could not be altered to eliminate potential impacts on these species, and abandonment was not considered feasible, then consultation with the U.S. Fish and Wildlife Service would be initiated.

Management actions would be modified to prevent the need to list federal candidate, state listed, state candidate, and Bureau sensitive species. The habitat of BLM assessment species would be conserved where possible. As funding permits, systematic inventories would be conducted of populations and distributions of special status species where baseline information is lacking.

Habitat management plans would be written and implemented for federally listed or proposed threatened or endangered species with an official recovery plan. Management plans would be prepared for federal candidate, state listed, state candidate, and Bureau sensitive species when necessary.

The Lost River sucker, shortnose sucker, Townsend's big-eared bat, Klamath largescale sucker, western pond turtle, and Schuh's homoplectran caddisfly would have no special management actions beyond those under Bureau policy or the Endangered Species Act.

Bald eagle habitat would be managed as outlined in the Bald Eagle Management Guidelines of Oregon-Washington and the *Working Implementation Plan for Bald Eagle Recovery in Oregon and Washington*. This would include a maximum 30-acre buffer around each nest and roost site.

Management of northern spotted owls would follow the 50-11-40 rule (see Glossary) when possible. The Klamath Falls Resource Area has 11 owl sites that would receive 80-acre buffers.

Management of peregrine falcons would focus on surveying for their presence and identification of potential and suitable nesting habitat. Potential habitat in cliff areas of the Klamath River Canyon would be protected.

Up to 20,000 acres of upland game bird habitat would continue to be improved for sage grouse through a rest rotation grazing system.

See Table 2-2 in the draft for a comparison of management actions by alternative.

## **Wildlife Habitats**

On the west side of the Klamath Falls Resource Area, snags would be left every ¼ mile along the upper Klamath River for osprey and a 660 foot radius (30 acre) no-cut buffer zone would protect known nest sites. On the east side, a buffer zone with a radius of 330 feet (8 acres) would protect osprey nests and alternate nest sites. Snags, culls, and damaged trees would be left in timber sale areas for osprey, except along roads or if they were hazard trees. Snags and dying trees in Gerber Reservoir above the average high water level would be left in place unless they posed a safety hazard.

Turkey habitat would be improved through projects such as rehabilitating and improving meadows, protecting oak and hardwood stands more than 200 feet from roads, planting and fencing small plots with high yield grains and grasses, and protecting and buffering turkey roost sites.

West side trout habitat would be maintained or improved through various projects, such as removal of debris jams that prevent migration, re-establishment



## Chapter 2 - Description of the Alternatives

of streamside vegetation, modification or replacement of culverts that inhibit migration, and improved livestock grazing practices. No-cut streamside buffers of 100 feet would be left on class 1 and 2 streams (see Appendix 2-B in the draft) that contain trout after timber harvests. See Table 2-5 in the draft for proposed fish habitat enhancement projects. Trout habitat on the east side would be maintained or improved only as a result of riparian exclosures and improved grazing practices.

In Roosevelt and Rocky Mountain elk habitat on the west side, clearcuts would be limited to 40 acres, uneven-age management would be used when appropriate, harvest activities would be restricted around elk calving areas, wet meadows would be protected, and hiding cover would be maintained in drainages. Rocky Mountain elk on the east side would benefit from management of deer habitat.

West side spring, summer, and fall range for mule deer and Columbian black-tailed deer would be managed as stated for elk. West side critical deer winter range would be maintained or improved through a variety of habitat practices, including rejuvenation of brush fields, obtaining private lands through exchanges or other mutual agreements, planting perennial grasses, improving livestock management systems, maintaining cover, and closing roads. Deer habitat on the east side would be managed to maintain or improve transition and critical winter range through water developments, fencing riparian areas, seasonal road closures, and prescribed burning.

Black bear habitat improvement projects on the west side would include maintaining important bear denning areas, cliffs, caves, wallows, and seeps in their present conditions; and rejuvenating stagnated brush fields to produce preferred foraging areas. No specific management would occur for bear habitat on the east side.

Primary cavity nesting species would be managed at 40 percent of their maximum population potential on timber lands, and at 100 percent within buffers and withdrawn lands. Oak stands on the west side would also be maintained for cavity nesters and dwellers.

No special management actions would be implemented for the cougar.

See Table 2-3 in the draft for a comparison of other management actions by alternative.

Wooded swamps would be managed on a site-by-site basis, primarily with buffer zones. The type of impact, season of impact, and extent or duration of impact

would determine the management direction. Wet meadows would be managed on a site-by-site basis. Marsh wetlands would be maintained or improved on a site-by-site basis and would primarily benefit waterfowl. Cliffs and talus slopes would be withdrawn from the commercial forest land base. Dryland hardwood stands would not be available for timber harvest. Occasionally, they would become part of fuelwood harvesting units. Cover on these stands would be reduced to improve forage for grazing. In deer winter range on the west side, brushfields would be rejuvenated through fire or scarification and then seeded (up to 25 percent of this habitat during the life of the plan). On the east side, prescribed burning programs would be conducted to protect brushfields from catastrophic fire.

## Special Areas

No special areas, areas of critical environmental concern, or research natural areas would be designated. No special management attention would be given to areas of special interest. See Table 2-6 in the draft for a comparison of management actions by alternative.

## Recreation

Except for nominating Topsy Road and the Modoc Trail to the National Back Country Byways System, those management actions listed in the Recreation section of the Management Direction Common to Alternatives through E are currently in effect and would continue. In addition to the off-highway vehicle designations listed under the Management Direction Common to Alternatives through E, the following existing off-highway vehicle designations would also remain unchanged.

- ◆ Lower Klamath Hills Wildlife Area - 1,390 acres **closed**;
- ◆ Klamath Deer Winter Range - 7,990 acres **limited** (seasonal closure from November 1 to April 15);
- ◆ Gerber Block - 35,400 acres **limited** (seasonal closure from November 1 to April 15);
- ◆ Stukel Mountain - 11,550 acres **limited** (seasonal closure from November 1 to April 25); and
- ◆ Pokagama Wildlife Area - 7,600 acres **limited** (seasonal closure from November 1 to April 15).

## Wild and Scenic Rivers

Miller Creek, Barnes Valley Creek, Spencer Creek, segments A and C of Antelope Creek, and segment 2 of the upper Klamath River were determined eligible for designation under the National Wild and Scenic Rivers Act (the eligibility criteria are described in Appendix 2-E in the draft). Eligible river segments would be managed under the BLM's interim protective management guidelines (as described in the Management Direction Common to All Alternatives section and in Appendix 2-E in the draft) either until the Congress makes a determination on their inclusion in the National Wild and Scenic Rivers System or they are determined to be not suitable (see Appendix 2-E in the draft). See Table 3-23 in the draft for a list of potential wild, scenic, and recreational rivers and their eligibility status. See Table 2-15 in the draft for a list of suitable rivers by alternative.

## Wilderness Study Areas

The Mountain Lakes Wilderness Study Area would be managed under the BLM's wilderness interim management policy.

## Visual Resources

Bureau of Land Management-administered land would continue to be managed following visual resource management classes established in the Jackson-Klamath and Lost River Management Framework Plans.

To evaluate specific proposed projects, a contrast rating system would be used to measure the degree of contrast between the proposed activity and the existing landscape. This score would be compared with allowable levels of contrast for the appropriate management class. The comparison determines whether or not mitigation is required to reduce visual impacts.

Acres to be managed for each Visual Resource Management class are shown in Table 2-1.

## Cultural Resources

The BLM would continue to identify localities with cultural resource values (including archaeological sites, Native American traditional use areas, and

historic sites) and manage them for their public and scientific uses. This objective would largely be accomplished through implementation of 36 Code of Federal Regulations 800 which ensures that authorized land use actions do not inadvertently harm or destroy cultural resources located on BLM-administered lands or actions permitted by the BLM on private lands. To achieve this goal, Class III cultural resource surveys (see Appendix 3-F in the draft) would be conducted on all lands to be impacted by earth disturbing activities, such as timber harvests, road construction, range land improvements, and recreation site development. Paleontological resources would continue to be protected through implementation of the 1906 Antiquities Act, which requires permits for the removal of significant paleontological resources.

## Land Tenure

The Lost River Management Framework Plan Amendment (1988) placed public lands into land tenure zones based upon their known resource values. Public lands in zone 1 (see the Management Direction Common to All Alternatives, Land Tenure section) would be **retained**. Public lands in zones 2 or 3 could be **exchanged** for those private lands in zones 1 or 2 where important resource values would be obtained or management efficiency would be increased. Public lands in zone 3 could be **sold** if no opportunities for exchange were identified, and there were no opportunities for transfer to another federal agency, and there was an interested purchaser.

Under the Jackson-Klamath Management Framework Plan, 300 acres could be sold or exchanged; while other public lands would be retained in public ownership. Only U.S. Forest Service land was identified for acquisition by exchange.

Bureau of Land Management-administered lands would be available for disposal or long term lease under the Recreation and Public Purposes Act to state or local government agencies, pending evaluation in accordance with the National Environmental Protection Act and appropriate regulations.

Unauthorized uses would be resolved. Resolution could include issuance of a temporary land use permit until the land could be leased or sold, or the unauthorized use could be terminated. Public lands could be available for temporary land use permits and longer term leases, subject to environmental and procedural review in accordance with National Environmental Policy Act and the regulations governing land use permits and leases.



## Hydroelectric and Alternative Energy Projects

The right-of-way application for the Salt Caves hydroelectric project would be denied due to conflicts with Visual Resource Management Class II designation for the Klamath River Canyon. See the Visual Resource Management section in Management Direction Common to All Alternatives for Visual Resource Management class objectives.

Pumped storage projects could be authorized pending site-specific environmental analyses. Significant effects would be mitigated or avoided prior to issuance of a right-of-way grant.

## Rights-of-Way

No right-of-way **exclusion** areas would be identified. Critical deer winter range on the east side would be considered an **avoidance** area.

Public lands would be available, as needed, for electric power distribution lines; telephone lines; county, state, or federal road expansion; and other miscellaneous right-of-way purposes. These actions would be subject to review under the National Environmental Policy Act.

To the maximum extent possible, future high voltage electric and gas transmission lines would be restricted to existing corridors. Existing communication sites are displayed in Table 2-16 in the draft. All of these sites are capable of and would be available for future expansion subject to the restrictions listed in Table 2-16 in the draft.

## Access

Public land access to large tracts in zone 1 (see the Land Tenure section in Management Direction Common to All Alternatives) would be acquired. Access to public lands in zone 2 could be obtained as needed. Where public access is desired, the minimum access necessary to achieve management objectives would be acquired. The preferred method would be through negotiated purchase or exchange.

## Withdrawal Review

Withdrawals (see Glossary) that are no longer needed would be revoked, and those that continue to

serve their original purpose would be retained. See Table 2-8 in the draft.

## Energy and Minerals

Under this alternative, 202,700 acres of the 235,900 acres of federally-owned **locatable** minerals would be open to mining claim location and operation subject to standard requirements. Another 27,400 acres would be subject to additional restrictions. About 4,300 acres would continue to be withdrawn from mineral entry, with an additional 1,500 acres withdrawn from nonmetalliferous mineral entry (see Table 2-10).

Under this alternative, 164,600 acres of the 238,700 acres of federally-owned oil and gas and 237,300 acres of federally-owned geothermal resources would be available for **leasing** subject to standard requirements. An additional 70,400 acres of oil and gas, and 69,000 acres of geothermal resources would be open to leasing subject to additional restrictions. No surface occupancy stipulations would be imposed on another 3,400 acres of oil and gas and geothermal resources. Leasing would not be allowed within the 300-acre Mountain Lakes Wilderness Study Area (see Table 2-11 in the draft).

Under this alternative, 181,300 acres of the 237,300 acres of federally-owned **salable** minerals would be open to mineral material disposal subject to standard requirements. About 3,400 acres would be unavailable for mineral material disposal in order to protect important resource values and special investments. An additional 52,600 acres would be open to mineral material disposal subject to additional restrictions (see Table 2-12 in the draft).

## Rural Interface Areas

No special management would occur in rural interface areas. See Table 2-1 for a comparison of management actions by alternative.

## Livestock Grazing

The current livestock grazing management system's active preference and seasons of use for all 95 grazing allotments within the Klamath Falls Resource Area would be maintained (see Appendix 2-H in the draft). These grazing allotments would be managed under the principles of multiple use and sustained yield.

## **Wild Horses**

See Management Direction Common to Alternatives A through E.

## **Roads**

See Management Direction Common to Alternatives A through E.

## **Noxious Weed Control**

Current management for the control of noxious weeds is provided by the Oregon Noxious Weed Control final Environmental Impact Statement and supplemental Environmental Impact Statement dated respectively April 7, 1986 and May 5, 1987. Local direction for the planning area takes the form of a Noxious Weed Control Plan and environmental assessment decision record of July 1993. See Table 2-13.

## **Hazardous Materials**

See Management Direction Common to Alternatives A through E.

## **Fire**

Up to 1,850 acres per year of prescribed burning would be allowed for site preparation and fuel hazard reduction.

Up to 200 acres per year of prescribed burning would be allowed for wildlife habitat and forage enhancement. See Table 2-14 in the draft for a comparison of management actions by alternative.

## **Management Direction for Alternative A**

### **Objective**

Emphasize high production of timber, forage, and other economically important values on all lands to contribute to community stability.

## **Water Quality and Riparian Zones**

Legal requirements for protection of wetlands and water quality would be met to protect trout habitat and other relevant values.

Riparian management areas would be established averaging 75 feet from each side of perennial and other important streams (generally 3rd order and larger, see Glossary), and other waters (such as lakes and ponds). Actual riparian management area widths would be determined by on-the-ground riparian vegetation, terrain, and stream characteristics.

Forage utilization by livestock in riparian zones would be managed to meet minimum water quality standards while maximizing forage production.

## **Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity**

A portion of BLM-administered forest lands would be available for management of biological diversity, including old growth characteristics and would not be subject to planned timber harvest. These forest lands include: nonsuitable woodlands, existing high-use recreation sites, forest lands allocated for riparian zone protection in riparian management areas, and core areas around bald eagle nest sites. On the west side, these forest lands total 6,280 acres, of which 320 acres are currently old growth and 2,050 acres are mature forest. On the east side, these forest lands total 200 acres, of which 40 acres are currently old growth and 60 acres are mature forest.

## **Timber**

Forest lands in the nonsuitable woodland category of the commercial forest land timber production capability classification would not be subject to planned harvest (see the Alternative A map). Other forest lands not allocated to planned timber harvest would include existing high-use recreation sites, riparian management areas, Congressionally designated wilderness or wild and scenic rivers, bald eagle and peregrine falcon nest site protection areas, and other areas required for threatened and endangered species recovery. On the west side, these lands total

6,300 acres, of which 400 acres currently are old growth and 2,000 acres are mature forest. On the east side, these forest lands total 200 acres, of which 40 acres are currently old growth and 60 acres are mature forest. This alternative does not include protection for the northern spotted owl. Management actions for the protection of northern spotted owl habitat are covered under Alternative D.

On the west side, 41,200 acres would be allocated to timber production under this alternative; on the east side, 16,000 acres would be allocated (see Table 2-1). Projected ten-year timber harvest acreage and other timber management activities are shown in Table 2-1. The planned annual timber sale quantity for the expected life of the plan would be 2.5 million cubic feet (13.8 million board feet Scribner short log) for the west side. Of the planned sale quantity, 2.4 million cubic feet is attributable to the base program (site preparation; planting, including genetically selected stock; protecting seedlings; and plantation release). The balance of 0.1 million cubic feet is attributable to intensive management practices (fertilization, pre-commercial thinning, commercial thinning, and brush and hardwood conversion). On the east side, the planned annual timber sale quantity for the expected ten-year plan would be 0.27 million cubic feet (1.4 million board feet Scribner short log), all of which is attributable to the base program.

On the west side, an additional average annual 1,700 cubic feet (8,700 board feet) could be sold based on experimental harvest from forest lands in the timber production capability classification categories of suitable woodland-nonsuitable commercial forest land and fragile nonsuitable woodlands. These lands would be managed by acres, not volume, of timber.

The west side lands inventoried as suitable woodland-nonsuitable commercial forest land are forested lands not capable of prompt reforestation using artificial reforestation techniques, such as planting or seeding; although they appear to be capable of achieving reforestation from seed provided naturally by residual trees. Lands inventoried as fragile nonsuitable woodland are steep, rocky lands where planting trees is difficult. Based on observations made after the extensive wildfires of 1987, these lands appear to be capable of natural regeneration under partial cut or ecological forestry management regimes. Such regimes also appear to prevent significant losses in site productivity or watershed degradation. There are 170 acres within these two timber production capability classification classifications which could be available for harvest under Alternative A.

On the east side, an additional annual average volume of 15,300 cubic feet (79,200 board feet) could be sold in the timber production capability classification category of suitable woodland-nonsuitable commercial forest land. In addition, 16,400 cubic feet (130 cords) of western juniper could be sold from the timber production capability classification category of suitable woodland-noncommercial forest land. These lands would be managed by acres, not volume, of timber.

Timber production practices would be designed to improve wood quality characteristics. Suitable woodlands would be actively managed to provide for the production of firewood, biofuels, wood for chemicals, and other forest products. Economically marginal lands would be managed for timber production if they are inventoried as suitable commercial forest land. Regeneration harvest units would be seeded with legumes and shrubs where it would not conflict with timber management objectives.

Logging and transportation systems would be designed to support timber production. Roads would be kept open to meet timber or recreation management objectives.

### Special Status (Including Threatened and Endangered) Species Habitats

BLM management and permitting actions would be designed to conserve habitat of federal candidate category 1 and 2, state listed, and Bureau sensitive species where such actions would not diminish commercial use, such as timber production or livestock grazing. See Table 2-2 in the draft for a list of special status animal species known or suspected to exist on BLM-administered lands in the planning area, and their protection by alternative.

### Wildlife Habitats

Where consistent with safety considerations, all snags and mature nonmerchantable trees would be left. See Table 2-3 in the draft for a comparison of other management actions by alternative.

### Special Areas

Management of the Spencer Creek area under the Spencer Creek coordinated resource management plan would continue. See Table 2-6 in the draft for

proposed management of potential areas of critical environmental concerns and other areas of special interest (also see the Alternative A map).

## Recreation

See Table 2-1 and Table 2-7 in the draft for recreation sites, trails, and off-highway vehicle closures.

Off-highway vehicle routes and trails would be designated and signs placed in the Stukel Mountain area and the Gerber Block area. Existing off-highway vehicle designations that apply in the alternative are listed under the Management Direction Common to Alternatives A through E (Recreation section). The remainder of the Klamath Falls Resource Area would remain open to off-highway vehicle use.

Other existing off-highway vehicle designations listed under the Alternative No Action (Recreation section) would be rescinded under this alternative because these designations conflict with this alternative's objective of providing substantial developed and dispersed motorized recreation uses.

Table 2-7 in the draft shows proposed recreation management designations by alternative for recreation sites and areas (also see the Alternative A map). The following additional recreation management strategies are proposed:

- ◆ The existing recreation area management plan for the Klamath River Complex special management area would be updated to reflect a change in recreation management from semi-primitive motorized to roaded natural recreation opportunities (see Appendix 2-D in the draft).
- ◆ During winter months, a BLM patrol providing visitor assistance would be established on Hamaker Mountain. A parking area and informational signs would continue to be provided.
- ◆ In the Stukel Mountain area land exchanges would be pursued to provide easier public access. Main access would be improved.
- ◆ In the Gerber Block a coordinated resource management plan covering recreation and other resources would be developed.

## Wild and Scenic Rivers

No river segments would be found suitable for federal designation under the National Wild and Scenic Rivers Act.

## Wilderness Study Areas

If not designated as wilderness, the Mountain Lakes Wilderness Study Area (330 acres) would not receive any special management or other designation and would be available for timber harvest and other commodity development (see the Alternative A map in the draft).

## Visual Resources

Forest lands available for planned timber harvest would be managed as visual resource management Class IV, and the remaining lands (non-forest, nonsuitable woodland, suitable woodland-low site, and lands allocated for uses other than timber production) would be managed as inventoried by BLM resource personnel of the Klamath Falls Resource Area. See the Visual Resources section of Management Direction Common to Alternatives A through E for visual resource management objectives and standards by class. Acres that would be managed for each visual resource management Class are shown in Table 2-1.

## Cultural Resources

See Management Direction Common to Alternatives A through E.

## Land Tenure

Exchanges would be made to obtain lands that would enhance long-term forage production and the nondeclining harvest level of the commercial forest lands managed by the BLM, by improving age class distribution or other harvest level factors. Factors to be considered include, but are not limited to, grazing and timber site productivity, access to public lands, logical logging units, management of timber lands to facilitate timber harvest, and management of public grazing to facilitate public and private lands grazing administration. No exchanges would be made to obtain lands that are more valuable for nontimber or nongrazing purposes. No commercial timber or



## **Chapter 2 - Description of the Alternatives**

range lands would be sold or leased. No leases or conveyances of commercial range or timber lands would be made under the Recreation and Public Purposes Act.

### **Hydroelectric or Alternative Energy Projects**

A right-of-way grant would be issued for the Salt Caves hydroelectric project, as described in the Preferred Alternative of the Federal Energy Regulatory Commission's 1990 Final Environmental Impact Statement.

Right-of-way grants would be issued for all pumped storage projects approved and licensed by the Federal Energy Regulatory Commission.

### **Rights-of-Way**

See Management Direction Common to Alternatives A through E.

### **Access**

See Management Direction Common to Alternatives A through E.

### **Withdrawals**

See Management Direction Common to Alternatives A through E.

### **Energy and Minerals**

Under this alternative, 203,000 acres of the 235,900 acres of federally-owned **locatable** minerals would be open to mining claim location and operation subject to standard requirements. Another 27,100 acres would be subject to additional restrictions. About 4,300 acres would continue to be withdrawn from mineral entry with an additional 1,500 acres withdrawn from nonmetalliferous mineral entry (see Table 2-10 in the draft). Under this alternative, 175,200 acres of the 238,700 acres of federally-owned oil and gas and 237,300 acres of federally-owned geothermal resources would be available for leasing subject to standard requirements. An additional 60,800 acres of oil and gas, and 59,400 acres of geothermal resources would

be open to leasing subject to additional restrictions. No surface occupancy stipulations would be imposed on another 2,400 acres of oil and gas and geothermal resources. Leasing would not be allowed within the 300-acre Mountain Lakes Wilderness Study Area (see Table 2-11 in the draft).

Under this alternative, 175,300 acres of the 237,300 acres of federally-owned salable minerals would be open to mineral material disposal subject to standard requirements. About 7,000 acres would be unavailable for mineral material disposal in order to protect important resource values and special investments. An additional 55,000 acres would be open to mineral material disposal subject to additional restrictions (see Table 2-12 in the draft).

### **Rural Interface Areas**

No special management would be provided in rural interface areas. See Table 2-1 for a comparison of management actions by alternatives.

### **Livestock Grazing**

Present livestock grazing management systems would be maximized to produce the highest sustained yield of forage and season of use for allotments. A long-term juniper control program would be implemented to maximize the potential for future forage needs and allocations. Specific animal unit month levels and seasons of use are shown for each allotment in Appendix 2-H in the draft.

### **Wild Horses**

See Management Direction Common to Alternatives A through E.

### **Roads**

Roads would be constructed to match timber harvest levels. A limited amount of road closures would be in effect.

### **Noxious Weed Control**

See Management Direction Common to Alternatives A through E.

## **Hazardous Materials**

See Management Direction Common to Alternatives A through E.

## **Fire**

Up to 2,200 acres per year of prescribed burning would be allowed for site preparation and fuel hazard reduction. Up to 740 acres per year of prescribed burning would be allowed for wildlife habitat and forage enhancement. See Table 2-14 in the draft for a comparison of management actions by alternative.

## **Management Direction for Alternative B**

### **Objective**

On Oregon and California lands west of Highway 97, emphasize timber production and other economically important values to contribute to community stability consistent with the variety of other land uses, such as fish and wildlife habitat, recreation, and scenic resources. Give equal consideration to all resource values on public domain lands. On lands east of Highway 97, emphasize forage production and other economically important values to contribute to community stability consistent with the variety of other land uses, such as fish and wildlife habitat, recreation, and scenic resources.

### **Water Quality and Riparian Zones**

Legal requirements for the protection of wetlands and water quality would be met, with moderate additional protection for trout habitat, other substantial streams, and other waters. Riparian management areas would be established with the following average widths on each side of perennial and other important streams (generally 3rd order and larger, see Glossary), and other waters:

- ◆ 3rd order streams - 75 feet;
- ◆ 4th order - 100 feet;
- ◆ 5th order - 140 feet;

- ◆ 6th order - 160 feet; and
- ◆ lakes, ponds, and other waters - 100 feet.

Riparian management areas would also be established on 1.5 miles of 2nd order streams to protect important beneficial uses (see Glossary). Actual riparian management area widths would be determined by on-the-ground riparian vegetation, terrain, and stream characteristics.

Forage utilization by livestock in riparian zones would be managed to meet minimum water quality standards while maximizing forage production consistent with other uses and values.

### **Retention, Maintenance and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity**

A portion of BLM-administered forest lands would be available for management of biological diversity, including old growth characteristics, and would not be subject to planned timber harvest. These forest lands include: nonsuitable woodlands, suitable woodlands-low site, recreation sites, forest lands allocated for riparian zone protection in riparian management areas, proposed areas of critical environmental concern and research natural areas, core areas around bald eagle nest sites, and other areas required for threatened and endangered species recovery. On the west side, these forest lands total 9,850 acres, of which 1,580 acres are currently old growth and 3,640 acres are mature forest. On the east side, these forest lands total 1,400 acres, of which 330 acres are currently old growth and 400 acres are mature forest.

Additionally, a corridor system would be defined to contribute to habitat diversity. Identified forest lands within the corridors would be aggregated in blocks of approximately 80 and 640 acres and incorporated into a corridor system by seed zone and elevation. These blocks would not be subject to planned harvest. The 640-acre blocks would be distributed approximately six miles apart within the corridors, with 80-acre stepping stone blocks located approximately every mile between the larger blocks. Whenever possible, these blocks would be placed on public domain lands and/or land excluded from timber harvest for other reasons. On the west side, the main corridor is the Klamath River Canyon. An additional block and stepping stones are located in the Miller Creek - Buck Mountain area. These forest lands total 2,800 acres, of which 1,000 acres currently are old growth and



1,300 acres are mature forest. On the east side, one corridor is located along Swan Lake Rim. Isolated blocks are located on Yainax Butte, Mountain Lakes Wilderness Study Area, and along Miller Creek Canyon. These forest lands total 900 acres, of which 300 acres are currently old growth and 300 acres are mature forest. The Alternative B map in the draft shows the locations of the blocks and stepping stones.

During timber sale planning, suitable wildlife trees would be identified for retention to provide for 40 percent of the optimum of cavity dwelling wildlife species. This level of retention equates to approximately one snag or green cull (nonmerchantable) per acre; the minimum size of wildlife trees would be 16 inches diameter at breast height.

## Timber

Forest lands in the nonsuitable woodland and suitable woodland-low site timber production capability classification categories would not be subject to planned harvest (see the Alternative B map in the draft). Other forest lands not allocated to planned timber harvest would include existing high-use recreation sites, riparian management areas, proposed areas of critical environmental concern and research natural areas, wilderness areas, bald eagle and peregrine falcon nest site protection areas, and other areas required for threatened and endangered species recovery. On the west side, these forest lands total 9,900 acres, of which 1,600 acres currently are old growth and 3,600 acres are mature forest. On the east side, these forest lands total 1,400 acres, of which 300 acres are currently old growth and 400 acres are mature forest. This alternative does not include protection for the northern spotted owl. Management actions for the protection of northern spotted owl habitat is covered under Alternative D.

On the west side, 37,500 acres would be allocated for intensive timber production and 130 acres for restricted timber production; on the east side, 14,700 acres would be allocated for intensive timber production and 50 acres for restricted production (see Table 2-1). Projected ten-year acres for timber harvest and other timber management activities are shown in Table 2-1. The planned annual timber sale quantity for the expected life of the plan would be 2.1 million cubic feet (11.8 million board feet Scribner short log) for the west side and 0.25 million cubic feet (1.29 million board feet Scribner short log) for the east side.

On the west side an additional average annual 700 cubic feet (3,900 board feet) would be expected to

be sold based on experimental harvest from forest lands in the timber production capability classification categories of suitable woodland-nonsuitable commercial forest land and fragile nonsuitable woodlands. These lands would be managed according to acres, not volume, of timber. See Alternative A for descriptions of lands inventoried as suitable woodland-nonsuitable commercial forest land and fragile nonsuitable woodland. These lands would be available for harvest under Alternative B.

On the east side, an additional annual average volume of 15,300 cubic feet (79,200 board feet) could be sold in the timber production capability classification category of suitable woodland-nonsuitable commercial forest land. In addition, 16,400 cubic feet (130 cords) of western juniper could be sold from the timber production capability classification category of suitable woodland-noncommercial forest land. These lands would be managed by acres, not volume, of timber. Timber production practices would be designed to improve wood quality characteristics. Suitable commercial forest lands considered economically marginal would be managed for timber production. Silvicultural practices within identified sensitive rural interface areas would be modified to employ ecological forestry practices that are included use of even-age shelterwood and uneven-age silvicultural systems, hand piling of slash, and backpack application of herbicide. Regeneration harvest units would be seeded with grass, legumes, and shrubs where it would not conflict with timber management objectives.

Roads would be kept open to meet timber and recreation management objectives. Public access to quarry roads within rural interface areas would be minimized.

## Special Status (Including Threatened and Endangered) Species Habitats

BLM management and permitting actions would be designed to protect habitats of federal candidate category 1 and 2, state listed, and Bureau sensitive plant and animal species on Oregon and California lands where such actions would not diminish commercial use, such as timber production. On public domain lands, habitats of all the above cited species would be protected, consistent with other resource management objectives. If any of the cited species were suspected to be present on public domain land in an area proposed for a specific site-disturbing activity, field surveys would focus on those species. See Table 2-2 in the draft for a comparison of other management actions by alternative.

## Wildlife Habitats

On lands available for timber harvest, snags and unmerchantable cull trees would be retained to provide nest sites for 40 percent of optimal cavity nester populations, both for present needs and long-term sustainability. This retention level corresponds to approximately 1.2 snags per acre (or 120 snags per 100 acres) on the west side and 0.9 snags per acre (or 90 snags per 100 acres) on the east side. See Table 2-3 in the draft for a comparison of management actions by alternative.

## Special Areas

The following areas would be designated as areas of critical environmental concern:

- ◆ Yainax Butte - 720 acres;
- ◆ Miller Creek - 2,000 acres; and
- ◆ Klamath River Canyon - 4,960 acres.

See Table 2-6 in the draft for proposed management of potential areas of critical environmental concerns and other areas of special interest (see also the Alternative B map in the draft).

## Recreation

Informational, educational, and recreational opportunities would be developed, including development of nature or multi-purpose trails in one or more of the following areas: Hamaker Mountain area and Swan Lake Rim, and development of overnight camping or day-use facilities in the Hamaker Mountain area. See Table 2-1 and Table 2-7 in the draft for recreation sites, trails, and off-highway vehicle closures.

Off-highway vehicle routes and trails would be designated and signs placed in the Stukel Mountain and Gerber Block areas. Existing off-highway vehicle designations that apply in this alternative are listed under the Management Direction Common to Alternatives A through E, Recreation section. The remainder of the Klamath Falls Resource Area would remain open to off-highway vehicle use.

Other existing off-highway vehicle designations listed under the Alternative No Action Recreation section, would be rescinded under this alternative. These designations conflict with this alternative's objective of providing for a wide range of developed and dispersed motorized recreation uses and opportunities.

Table 2-7 in the draft shows proposed recreation management designations by alternative for recreation sites and areas (see also the Alternative B map in the draft). The following additional recreation management strategies are proposed:

- ◆ The existing recreation area management plan for the Klamath River Complex special recreation management area would be updated to reflect a change in recreation management from semi-primitive motorized to roaded natural recreation opportunities (see Appendix 2-D in the draft). The BLM would provide fire-safe, approved, and developed group campsites. The Topsy recreation site and BLM campground in the Klamath Canyon would be improved and barrier-free access provided.
- ◆ In the Hamaker Mountain area options would be retained for future trail and site development, with an emphasis on winter sports, and for establishing an special recreation management area on public lands in T. 40 N., R. 7 E., Sec. 22. During winter months a BLM patrol providing visitor assistance would be established on Hamaker Mountain.
- ◆ In the Stukel Mountain area easier public access would be pursued through land exchanges and designated off-highway vehicle and public access routes. Main access would be improved.
- ◆ In the Gerber Block a coordinated resource management plan covering recreation and other resources would be developed.

## Wild and Scenic Rivers

No river segments would be found suitable for federal designation under the National Wild and Scenic Rivers Act.

## Wilderness Study Areas

If not designated as wilderness, the Mountain Lakes Wilderness Study Area (330 acres) would be managed for retention and maintenance of old growth, mature forest, and habitat diversity (see the Alternative B map in the draft).

## Visual Resources

Available forest land within ¼ mile of developed recreation sites, state and federal highways, and

state scenic waterways would be managed as inventoried (see the Alternative B map in the draft). All other available forest land would be managed as Visual Resource Management Class IV, except as noted under the Rural Interface Area section. The remaining lands (non-forest, nonsuitable woodland, suitable woodland-low site, and lands allocated for uses other than timber production) would be managed as inventoried. Acres to be managed for each visual resource management class are shown in Table 2-1.

## Cultural Resources

The following affirmative measures would be implemented, but would be susceptible to change based on the accumulation of new data.

- ◆ One or two eligible sites would be nominated to the National Register of Historic Places. The exact number and acreage of such sites would be determined during the nomination process.
- ◆ A systematic survey of some areas that are highly likely to contain cultural resources would be conducted.
- ◆ Physical site protection and stabilization measures, such as soil erosion control and limiting public access, would be implemented to reduce deterioration of the most important endangered sites.
- ◆ The Klamath Tribe would be contacted in an effort to enter into negotiations to develop a memorandum of understanding to provide for tribal input on BLM projects and to identify and address tribal concerns.
- ◆ As part of the Adventures in the Past initiative, a small scale cultural resources interpretation effort, such as a lobby display or brochure, would be implemented.

## Land Tenure

On lands west of Highway 97, **exchanges** of Oregon and California lands would be made primarily to obtain lands that would enhance timber management opportunities. Exchanges of public domain lands would be made to benefit one or more of the resources managed, including non-timber values. **Sale** of Oregon and California lands, other than available commercial forest lands, and of public domain lands would be made to dispose of lands that meet any of

the criteria of the Federal Land Policy and Management Act, section 203(a). Leases on such lands would be made to accommodate other uses. Leases or conveyances under the Recreation and Public Purposes Act would be made in zone 2 and 3 lands to provide appropriate services or facilities.

On lands east of Highway 97, **exchanges** of public domain lands would be made primarily to obtain lands that would enhance forage management opportunities. **Sale** of public domain lands other than range lands, would be made to dispose of lands that meet any of the criteria of the Federal Land Policy and Management Act section 203(a). Leases under section 302 of the Federal Land Policy and Management Act on such lands would be made to accommodate other uses. Leases or conveyances under the Recreation and Public Purposes Act would be made in zone 2 and 3 lands to provide appropriate services or facilities.

## Hydroelectric or Alternative Energy Projects

A right-of-way grant would be issued for the Salt Caves hydroelectric project, as described in the Preferred Alternative of the Federal Energy Regulatory Commission's 1990 Final Environmental Impact Statement.

A right-of-way grant would be issued for all pumped storage projects approved and licensed by the Federal Energy Regulatory Commission.

## Rights-of-Way

See Management Direction Common to Alternatives A through E.

## Access

See Management Direction Common to Alternatives A through E.

## Withdrawals

See Management Direction Common to Alternatives A through E.

## Energy and Minerals

Under this alternative, 200,800 acres of the 235,900 acres of federally-owned locatable minerals would be open to mining claim location and operation subject to standard requirements. Another 29,300 acres would be subject to additional restrictions. About 4,300 acres would continue to be withdrawn from mineral entry, with an additional 1,500 acres withdrawn from nonmetalliferous mineral entry (see Table 2-10 in the draft).

Under this alternative, 175,800 acres of the 238,700 acres of federally-owned oil and gas and 237,300 acres of federally-owned geothermal resources would be available for leasing subject to standard requirements. An additional 52,600 acres of oil and gas, and 51,200 acres of geothermal resources would be open to leasing subject to additional restrictions. No surface occupancy stipulations would be imposed on another 10,000 acres of oil and gas and geothermal resources. Leasing would not be allowed within the 300-acre Mountain Lakes Wilderness Study Area (see Table 2-11 in the draft).

Under this alternative, 173,700 acres of the 237,300 acres of federally-owned salable minerals would be open to mineral material disposal subject to standard requirements. About 15,900 acres would be unavailable for mineral material disposal in order to protect important resource values and special investments. An additional 47,700 acres would be open to mineral material disposal subject to additional restrictions (see Table 2-12 in the draft).

## Rural Interface Areas

The 2,800 acres of BLM-administered lands located within ¼ mile of private lands in identified rural interface areas zoned for 1- to 5-acre lots would be managed for Visual Resource Management Class III objectives (see the Visual Resources section in the Management Direction Common to Alternatives A through E and the Alternative B map in the draft). Customary forest and range management practices would be altered where realistically feasible to mitigate the neighbors concerns. Examples of management options include, but are not limited to, harvest regimes other than clearcutting, hand application rather than aerial application of herbicides and pesticides, inclusion of additional buffers for domestic water sources, and hand piling slash for burning as opposed to broadcast burning. See Table 2-1 for management actions by alternatives.

## Livestock Grazing

On lands west of Highway 97, a sustained yield of forage would be produced for livestock, wildlife, and the Pokegama Wild Horse Herd, consistent with other uses and values.

On lands east of Highway 97, a high sustained yield of forage would be produced for livestock and wildlife consistent with other uses and values. A long-term juniper control program would be implemented to improve the potential for future forage needs and allocation. Specific animal unit month levels and seasons of use are listed for each allotment in Appendix 2-H in the draft.

## Wild Horses

See Management Direction Common to Alternatives A through E.

## Roads

Roads would be constructed to match timber harvest levels, and a limited amount of road closures would be in effect.

## Noxious Weed Control

See Management Direction Common to Alternatives A through E.

## Hazardous Materials

See Management Direction Common to Alternatives A through E.

## Fire

Up to 2,200 acres per year of prescribed burning would be allowed for site preparation and fuel hazard reduction. Up to 730 acres per year of prescribed burning would be allowed for wildlife habitat and forage enhancement. See Table 2-14 in the draft for a comparison of management actions by alternative.



## Management Direction for Alternative C

### Objective

Provide timber and forage production and other economically important values to contribute to community stability consistent with maintenance of biological diversity and the variety of other uses, such as fish and wildlife habitat, recreation, and scenic resources.

### Water Quality and Riparian Zones

Substantial protection for wetlands and riparian habitat, including trout habitat, would be provided along selected streams and other water environments.

Riparian management areas would be established with the following average widths on each side of perennial streams, other important streams (generally 3rd order and larger, see Glossary), and other waters:

- ◆ 3rd order streams - 105 feet;
- ◆ 4th order - 150 feet;
- ◆ 5th order - 210 feet;
- ◆ 6th order - 240 feet; and
- ◆ lakes, ponds, and other waters - 150 feet.

Research management areas would also be established on 3.4 miles of 2nd order streams to protect important beneficial uses (see Glossary). Actual riparian management area widths would be determined by on-the-ground riparian vegetation, terrain, and stream characteristics.

Livestock grazing management practices would provide for regrowth of riparian plants after use or would leave sufficient vegetation at the time of grazing for maintenance of plant vigor and stream-bank protection. Utilization levels within selected riparian habitats would be established, while allowing for the production of a moderate sustained yield of forage. Utilization levels would be set during the activity planning process, which follows the resource management planning process.

### Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity

A portion of BLM-administered forest lands (including woodlands) would be included in a system of 600- to 2,500-acre old growth restoration and retention blocks, which would be managed to retain and improve biological diversity, including old growth ecological characteristics (see the Alternative C map in the draft). In general, these areas would not be subject to planned timber harvest, except for density management thinnings designed to help the areas attain or maintain old growth characteristics. Silvicultural prescriptions in these areas would be designed with the objective of long-term retention and re-establishment of biological diversity by maintaining a complex ecosystem structure and function, and native species composition across the landscape.

Total acreage of forest lands allocated to old growth restoration and retention areas on the west side would be 9,600 acres, or 20 percent of BLM-administered forest land on the west side. In these blocks, 3,100 acres are currently inventoried as old growth and 2,900 acres as mature forest. On the east side, 2,000 acres of commercial forest would be allocated to restoration and retention areas, of which 500 acres are currently inventoried as old growth, and 500 acres are mature forest. The blocks include 12 percent of the suitable commercial forest lands and 7 percent of the total BLM-administered forest lands on the east side.

The remaining 38,100 acres of west side forest land and 14,200 acres of east side commercial forest land would be managed under partial stand retention prescriptions (see the Timber Management section). The lands to be managed for a high level of partial retention would be considered potential replacements for old growth restoration and retention areas lost to natural events.

Old growth restoration and retention areas on the west side would be located within biological connectivity corridors designed to provide linkage between the major reserves (such as wilderness areas) in the Rogue River, Winema, and Klamath national forests (see the Alternative C map in the draft). The corridors would also be designed to include clusters of special status species populations, including green flowered ginger (*Asarum wagneri*), Bellinger's meadowfoam (*Limnanthes floccosa* ssp. *bellingeriana*), pygmy

monkeyflower (*Mimulus pygmaeus*), and nesting sites for the northern spotted owl (*Strix occidentalis*).

The inclusion of the Klamath River Canyon in the corridor system would add a diversity of vegetation and wildlife habitat types associated with the variety of elevations and aspects in the canyon. The Klamath River Canyon also offers a migration and dispersal route for raptors and other organisms as one of only three rivers that bisect the Cascade Range. The inclusion of lands along the California border would add the diverse plant communities included in the white oak-ponderosa pine major plant group (see the Vegetation section of Chapter 3 for a description).

On lands east of Highway 97, no corridor system would be named, although restoration and retention blocks would be designated. This would allow for migration and dispersal of organisms throughout the area between BLM lands and adjacent U.S. Forest Service lands, as well as between designated blocks for restoration and retention of biological diversity. Restoration and retention blocks on the east side would include: BLM lands along Swan Lake Rim, which offer a diversity of plant communities and wildlife habitats associated with a variety of elevations; the Mountain Lakes Wilderness Study Area (see the Special Areas section); Yainax Butte (a potential area of critical environmental concern, see the Special Areas section), which offers unique plant communities, including populations of the blue flowered penstemon (*Penstemon glaucinus*) a federal candidate category 2 plant species; and Miller Creek Canyon (a potential area of critical environmental concern, see the Special Areas section), which offers mature and old growth ponderosa pine stands and the diverse plant communities and wildlife habitats associated with a variety of elevations and aspects. The Gerber Riparian Demonstration Area, which is included on the east side, contains a number of riparian areas that have been managed to improve their condition, such that native riparian vegetation has recovered and is providing valuable wildlife habitat as well as a major component of biological diversity in a high desert landscape.

Management would also enhance or restore these communities through the maintenance or reintroduction of natural ecological processes, such as fire (see the Fire and Wildlife sections). These actions would contribute to the habitat component of biological diversity necessary for the array of native wildlife species dependent on those communities. Such diversity would not be provided by the more intensively managed private and state lands composing the balance of the landscape. Main roads would be

the only roads within restoration and retention areas open to public use. No new roads would be constructed in these areas.

Agreements would be pursued with private landowners and other land management agencies to optimize the extent and distribution of biodiversity restoration and retention blocks while minimizing undue impact on multiple resource use.

## Timber

Forest lands in the nonsuitable woodland, suitable woodland-low site, and suitable woodland-nonsuitable commercial forest land timber production capability classification categories would not be subject to planned harvest (see the Alternative C map in the draft). Other forest lands not allocated to planned timber harvest would include old growth restoration and retention blocks, recreation sites, riparian management areas, areas of critical environmental concern, wild and scenic rivers, bald and golden eagle nest site protection areas, and other areas required for threatened and endangered species recovery. On the west side, these forest lands not subject to planned timber harvest total 15,800 acres, of which 3,100 acres are currently old growth and 4,400 acres are mature forest. On the east side, they total 2,800 acres, of which 500 acres are in old growth and 800 acres are mature forest.

On the west side, 31,800 acres would be allocated for **restrictive** timber production; on the east side, 13,400 acres would be allocated for **restricted** timber production (see Table 2-1). Projected ten-year acre figures for timber harvest and other timber management activities are shown in Table 2-1. The allowable annual timber sale quantity for the expected life of the plan would be 0.79 million cubic feet (4.5 million board feet Scribner short log) for the west side, and 0.23 million cubic feet (1.23 million board feet Scribner short log) for the east side. Because this alternative includes many elements recognized to be substantially untested, modeling its sustainable timber yield is more difficult than with the other alternatives, and the level of confidence is therefore lower.

All forest lands allocated to timber management in this alternative are managed under structural retention silvicultural systems. West side lands available for timber harvest would be managed under two different scenarios, depending on their relationship to the restoration and retention blocks and to the biological corridors. Forest lands within the biological corridors and those identified as buffers (one to two



miles around the restoration and retention blocks) would be managed for a high level of green tree retention (see the Alternative C map in the draft). Forest lands outside of corridors and buffer blocks would be managed for a lower level of green tree retention (see the Alternative C map in the draft).

Silvicultural prescriptions would be designed to achieve the highest level of timber production possible consistent with the protection of ecosystem health, the long-term retention and restoration of biological diversity, and conformance with management objectives. Such prescriptions would include principles of ecological forestry which strive to maintain complex ecosystem structure, function, and species across the landscape. Prescriptions would be designed to assure the regeneration of all indigenous tree species. They would vary depending on plant community, site characteristics, stand condition, and management objectives and would include both density management and/or regeneration harvests.

Individual or group selection harvests systems would be widely used in high retention areas. The use of even-age harvest systems would be limited to areas where old growth structures could be re-created more quickly by the use of such systems as compared to partial retention regimes. Clearcutting would still be used where appropriate for treatment of diseased stands. Intermediate harvests would aim at the acceleration of seral development and the production of old growth structural conditions as rapidly as possible, while maintaining habitat connectivity and immediate habitat usefulness. Intermediate harvests would occur on intervals ranging from 20 to 40 years, depending upon site quality.

Forest lands within the **lower retention** areas would be managed under partial stand retention prescriptions. The objective of these prescriptions would be a long term creation or re-creation of old growth conditions after regeneration harvests. Such harvests would retain only enough green trees and other structural components to provide protection from frost damage or to result in the development of stands that meet old growth definitions within the time frames approximated by normally managed forest rotations. Because of the potential for frost damage on the west side, retention of shelterwood trees for frost protection would result in maintaining stands similar to high retention regimes. Prescriptions would identify post-harvest stand conditions that would keep a portion of the larger trees in a stand as a range of sizes of dominant and co-dominant trees. The objective of intermediate harvest would be the acceleration of seral development and the creation of old growth

conditions as rapidly as possible. Timber sales and silvicultural prescriptions would be designed to encourage natural regeneration following timber harvest; however, to minimize regeneration lag, artificial regeneration would be used to supplement natural reforestation. Regeneration harvests, which would open a forest stand enough to establish a desired tree species, would be achieved through partial cutting, shelterwood retention, group selection (small clearcuts), or a combination of these. Uneven-age management would be used extensively on the east side. A mix of native species (generally based on the percentage of species existing in the stand) would be planted to help assure species diversity. Planting would occur at minimum densities. A maximum of 50 percent of the Douglas fir planting stock within a reforestation unit would be grown from genetically selected tree seed. This seed would be collected either from selected superior trees growing in natural stands or seed orchards developed from selected superior trees.

West side hardwood stands (predominately white oak) in hardwood sites could be managed for sustained yield production of hardwood timber. Hardwood stands in conifer sites could be converted to conifer production. Hardwoods would be retained in the re-established stand at a level consistent with identified target stand conditions. In conifer stand management, native hardwoods would be retained or restored if they occurred naturally within the major plant grouping. The goal would be to retain or attain a hardwood component resembling that within a similar site undisturbed by human activity within the same plant grouping. Logging and transportation systems would be designed to support the recommended silvicultural prescriptions. New roads would be constructed to standards appropriate to the expected use and at a density consistent with resource protection and multiple use. Road management actions, including closures, would incorporate biodiversity and multiple use needs. The sale of forest products would be designed to encourage full use of harvested timber. These sales would be designed to reserve ecological site features (such as snags and coarse woody debris) to provide for wildlife and other resource needs.

Both pre-commercial and commercial thinning would be used to maintain open canopy conditions and promote retention of mixed species. Commercial thinning would be used to accelerate development of old growth structural conditions.

Fertilization would be used where relevant to supplement natural nitrogen fixation, enhance growth, and hasten development of vertical structure and large

trees. Fertilization would not be assumed to contribute to the allowable sale quantity in multiple canopy silvicultural regimes.

Prescribed fire would be used as a favored tool for site preparation, fuel reduction, and to restore or retain natural ecological processes through site disturbance. Herbicides would be used only in individual plant treatment or spot application for site preparation and release consistent with ecosystem objectives.

## Special Status (Including Threatened and Endangered) Species Habitats

In addition to protection of federally listed or proposed threatened or endangered plant or animal species, management of areas to restore and retain biological diversity would provide protection for clusters of federal candidate category 1 and 2, state listed, Bureau sensitive, and Bureau assessment species. Management and permitting actions by the BLM would also be designed to protect habitats of federal candidate category 1 and 2, state listed, and Bureau sensitive plant and animal species on Oregon and California lands where mitigation would not diminish commercial use, such as timber harvest and livestock grazing, from lands allocated to such use. On public domain lands, management actions and permitted actions would be designed to protect habitats of federal candidate category 1 and 2, state listed, and Bureau sensitive species. If any of the cited species were suspected to be present on public domain lands in an area proposed for a site-disturbing activity, field surveys would focus on those species; if their presence were identified, their habitat would be protected. See Table 2-2 in the draft for a comparison of management actions by alternative. If Bureau assessment species were found on BLM lands, sighting forms would be completed. Also, the appropriate sighting form would be completed and submitted to the Oregon Natural Heritage Program. Mitigating actions for the protection of habitat would be discretionary.

## Wildlife Habitats

On lands available for timber harvest, snags, live green cut trees, and green merchantable trees would be retained to provide nest sites for a minimum of 60 percent of optimal cavity nester populations, both for present needs and long-term sustainability. This

retention level corresponds to approximately 1.9 snags per acre (or 190 snags per 100 acres) on west side and 1.4 snags per acre (or 140 snags per 100 acres) in forested habitat on the east side.

Timber harvests on the west side would be designed to retain (where available) enough dead and down material to meet Old Growth Definition Task Group standards, which vary according to plant community series. For **Douglas fir** stands on mixed conifer sites, the minimum standards would be to retain 10 tons of dead and down logs per acre, including 2 pieces per acre 24 inches in diameter and longer than 50 feet. Minimum standards for east side timber harvests in **ponderosa pine** stands would be to retain, where available, dead and down materials at approximately 5 tons per acre including 3 to 6 pieces per acre at least 12 inches in diameter on the large end and at least 8 feet long.

Minimum standards for east side timber harvests in **ponderosa pine** stands would be to retain, where available, 3 conifer snags or green culls per acre with a diameter at breast height of greater than 14 inches; dead and down materials would be retained at approximately 5 tons per acre including 3 to 6 pieces per acre at least 12 inches in diameter on the large end and at least 8 feet long.

In accordance with other management activities, road system management would have a goal of reducing open road density to 1.5 miles or less per section. Existing seasonal off-highway vehicle closures in big game winter ranges would remain in effect throughout the plan.

Roads in other sensitive wildlife habitats could be evaluated for possible seasonal closures to general public travel; however, these roads could remain open for administrative use, forest product removal, and access for mineral exploration and development. See the Recreation section for more detail.

Special habitats would be buffered from timber harvest and other surface disturbing activities. Table 2-4 in the draft shows special habitat buffers by alternative (see also Table 2-3 in the draft for management of other wildlife habitat).

As opportunities arise, private lands within the biodiversity corridors would be obtained through exchange or other mutual agreement to improve connectivity for wildlife movement within these corridors.

## Special Areas

The following areas would be designated as areas of critical environmental concern:

- ◆ Yainax Butte - 720 acres;
- ◆ Miller Creek - 2,000 acres;
- ◆ Klamath River Canyon - 5,000 acres; and the
- ◆ Pacific Crest Trail - 600 acres in the Klamath Falls Resource Area.

See Table 2-6 in the draft for proposed management of potential areas of critical environmental concerns and other areas of special interest (see also the Alternative C map in the draft).

Other areas of special interest to receive special management attention include: The Bumpheads - 50 acres would be managed for scientific (native plant communities) and recreational (scenic) values; Alkali Lake - 240 acres would be managed for riparian and aquatic habitat and waterfowl migration; Tunnel Creek Wetlands - 280 acres would be managed for scientific (wildlife and plant communities) values; Clover Creek Educational Area - 30 acres would be managed for scientific and educational purposes; Surveyor Forest Area - 150 acres would be managed for scientific and educational purposes (natural processes); and Spencer Creek - 210 acres would be managed under Visual Resource Management Class II for recreational and fisheries values to 500 feet from either side of the creek. The Spencer Creek coordinated resource management plan would continue to be in effect for the area.

The Old Baldy proposed research natural area would be considered for designation as an research natural area/areas of critical environmental concern if it met an empty cell need.

If the opportunity arose, private lands along the shores of Alkali Lake and/or Tunnel Creek Wetlands would be obtained through exchange or other mutual agreement. Cooperative management of private lands along the Tunnel Creek Wetlands would be pursued.

## Recreation

Informational, educational, and recreational opportunities would be developed, including development of nature or multi-purpose trails in one or more of the following areas: Surveyor recreation site (Johnson Creek), Spencer Creek area, Bryant Mountain area, Hamaker Mountain area, Stukel Mountain area, Swan Lake Rim, and/or Gerber Block area (Miller Creek and Potholes); development of overnight camping or

day-use facilities could occur in the Hamaker Mountain area, Bryant Mountain area, and/or Gerber Block area; and development of interpretive sites and facilities for wildlife, historic or cultural sites, or other natural resources in the Surveyor recreation site, Hamaker Mountain area, and/or along Highway 66. See Table 2-1 and Table 2-7 in the draft for recreation sites, trails, and off-highway vehicle closures.

In addition to the off-highway vehicle designations listed under the Management Direction Common to Alternatives A through E, the following existing off-highway vehicle designations would also remain unchanged.

- ◆ Lower Klamath Hills Wildlife area - 1,390 acres closed;
- ◆ Klamath Deer Winter Range - 7,990 acres limited (seasonal closure from November 1 to April 15);
- ◆ Gerber Block - 35,400 acres limited (seasonal closure from November 1 to April 15);
- ◆ Stukel Mountain - 11,550 acres limited (seasonal closure from November 1 to April 25); and
- ◆ Pokegama Wildlife Area - 7,600 acres limited (seasonal closure from November 1 to April 15).

The following areas would receive new off-highway vehicle closure designations: areas where water quality is being adversely affected; areas where soil erosion or other significant resource damage is occurring; Spencer Creek; and Miller Creek area of critical environmental concern. Off-highway vehicle use would be limited to designated roads and trails in the Klamath River Canyon area of critical environmental concern, Stukel Mountain area, and the west side biodiversity restoration and retention areas. Off-highway vehicle use in the Yainax Butte and Swan Lake Rim areas would be limited to existing roads and trails. Off-highway vehicle use in the Tunnel Creek and Bryant Mountain areas would be limited through additional seasonal closures.

Table 2-7 in the draft shows proposed recreation management designations by alternative for recreation sites and areas (see also the Alternative C map in the draft). The following additional recreation management strategies are proposed:

- ◆ For the Pacific Crest National Scenic Trail special recreation management area, a scenic 1/4-mile corridor (Visual Resource Management Class II management) would be provided on either side of trail. The trail corridor (620 acres) would be designated an area of critical environmental concern (see the Special Areas section).

- ◆ The Spencer Creek area would continue to be available for roaded natural recreation opportunities (see Appendix 2-D in the draft). Legal access could be acquired for a barrier-free fishing and hiking trail.
- ◆ Resource management would highlight public education about the coordinated resource management plan, the role of fire in ecosystem processes, illegal wood cutting, and other resource activities.
- ◆ The existing recreation area management plan for the Klamath River Complex special recreation management area would be evaluated and updated. The BLM would provide fire-safe, approved, and developed group campsites. The Topsy recreation site and BLM campground in the Klamath Canyon would be improved, and barrier-free access provided. Development of a cooperative agreement with Klamath and Siskiyou counties would be pursued to provide minimum annual maintenance on the Topsy Road.
- ◆ In the Hamaker Mountain area options would be retained for future trail and site development. A recreation area management plan would be developed with an emphasis on winter sports. During winter months a BLM patrol providing visitor assistance would be established on Hamaker Mountain.
- ◆ In the Stukel Mountain area a recreation area management plan would be developed for accommodating off-highway vehicle use and ease of public access on designated off-highway vehicle and public access routes. Main access would be improved. Development of hang gliding facilities would be considered.
- ◆ In the Gerber Block a coordinated resource management plan covering recreation and other resources would be developed.

To retain options for future development of high-value potential recreation sites, trails, and sightseeing opportunities no timber sales other than salvage sales of dead and dying timber would be made during the life of this plan in the areas listed in Tables 3-24, 3-26, and 3-27 in the draft. Exceptions would be made if a natural catastrophe (such as fire or wind-storm) destroyed the high-value recreation potential of the area.

## Wild and Scenic Rivers

Segment 2 of the upper Klamath River (11.0 miles) would be found suitable for designation as a **recre-**

**ational** river and would be managed under interim protective management as described under the Management Direction Common to Alternatives A through E section and Appendix 2-E in the draft. See Table 2-15 in the draft for suitability of eligible wild, scenic, and recreational rivers.

## Wilderness Study Areas

If not designated as wilderness, the Mountain Lakes Wilderness Study Area (330 acres) would be managed for retention and maintenance of old growth, mature forest, and habitat diversity (see the Alternative C map in the draft).

## Visual Resources

Available forest land where federal ownership consists of more than half of a viewshed (see Glossary), and available forest lands within ¼ mile of developed recreation sites, state and federal highways, proposed back country byways, state scenic waterways, and rivers designated under the National Wild and Scenic Rivers Act would be managed as inventoried (see the Alternative C map in the draft). All other available forest land would be managed as Visual Resource Management Class IV, except as noted under the Rural Interface Area section. The remaining lands would be managed as inventoried. Acres that would be managed for each Visual Resource Management class are shown in Table 2-1.

## Cultural Resources

The following affirmative measures would be implemented, but would be susceptible to change based on the accumulation of new data.

- ◆ Several eligible cultural resource sites would be nominated to the National Register of Historic Places. The exact number and acreage of such sites would be determined during the nomination process.
- ◆ A cultural resource management plan would be developed for either the Gerber Block or the upper Klamath River Canyon.
- ◆ An updated and expanded Class I cultural resource survey would be completed (see Appendix 3-F in the draft).
- ◆ A systematic inventory of areas that are highly likely to contain cultural resources would be conducted.



## Chapter 2 - Description of the Alternatives

- ◆ Systematic testing and evaluation of archaeological sites would be performed to assess their potential for contributing to public and scientific uses.
- ◆ Physical site protection and stabilization measures, such as soil erosion control and limiting public access, would be implemented to reduce deterioration of endangered sites.
- ◆ The Klamath Falls Resource Area would attempt to obtain, through exchange or other mutual agreement, private lands containing known and manageable cultural resources that are adjacent to public lands.
- ◆ Native American traditional use areas would be protected by maintaining the natural and cultural characteristics that make them significant.
- ◆ The Klamath Tribe would be contacted in an effort to enter into negotiations to develop a memorandum of understanding to provide for tribal input on BLM projects and to identify and address tribal concerns. Other potentially concerned Native American groups, such as the Modoc Tribe of Oklahoma, the confederated Modoc and Paiute tribes, and the Shasta Nation of California, would be contacted to see if, and to what extent, they would be interested in providing input to projects on BLM lands.
- ◆ Informational and educational opportunities would be provided to increase public awareness of the cultural resource program.

## Land Tenure

On lands west of Highway 97, exchanges of Oregon and California lands would emphasize opportunities that would either contribute to the conservation of biological diversity or enhance timber management opportunities. Exchanges of public domain lands would be made to benefit one or more of the resources managed (such as recreation, wildlife, and range). Sale of Oregon and California lands other than available commercial forest lands, and of public domain lands, could occur to dispose of lands that met any of the criteria in the Federal Land Policy and Management Act section 203(a). Leases on such lands would be made to accommodate other uses. Leases or conveyances under the Recreation and Public Purposes Act could be made in zone 2 and 3 lands to provide appropriate services or facilities.

On lands east of Highway 97, exchanges of public domain lands that would emphasize opportunities to contribute to the conservation of biological diversity,

benefit one or more of the resources managed (such as recreation, and wildlife habitat), or enhance forage management opportunities would be pursued. Sale of public domain lands other than range lands could be made to dispose of lands that met any of the criteria in the Federal Land Policy and Management Act section 203(a). Leases under section 302 of the Federal Land Policy and Management Act on such lands would be made to accommodate other uses.

Leases or conveyances under the Recreation and Public Purposes Act could be made in zone 2 and 3 lands to provide appropriate services or facilities.

As opportunities arise, private lands and easements on both the west and east sides would be obtained through exchange or other mutual agreements to enhance the management of deer winter range, special status species habitat, recreation opportunities, cultural resources, or other resources.

## Hydroelectric or Alternative Energy Projects

The Salt Caves hydroelectric project right-of-way application would neither be accepted nor denied until the Congress acts on designation of the Klamath River as suitable under the National Wild and Scenic Rivers Act.

Issuance of a right-of-way grant would be acceptable under this alternative for proposed alternative energy projects that are or can be made consistent with the management direction for other resources. Rights-of-way would be issued for the above projects only if they would not significantly affect other resource uses.

## Rights-of-Way

See Management Direction Common to Alternatives A through E.

## Access

See Management Direction Common to Alternatives A through E.

## Withdrawals

See Management Direction Common to Alternatives A through E.

## Energy and Minerals

Under this alternative, 183,600 acres of the 235,900 acres of federally-owned locatable minerals would be open to mining claim location and operation subject to standard requirements. Another 46,500 acres would be subject to additional restrictions. About 4,300 acres would continue to be withdrawn from mineral entry, with an additional 1,500 acres withdrawn from nonmetalliferous mineral entry (see Table 2-10 in the draft).

Under this alternative, 126,800 acres of the 238,700 acres of federally-owned oil and gas and 237,300 acres of federally-owned geothermal resources would be available for leasing subject to standard requirements. An additional 100,800 acres of oil and gas, and 99,400 acres of geothermal resources would be open to leasing subject to additional restrictions. No surface occupancy stipulations would be imposed on another 10,800 acres of oil and gas and geothermal resources. Leasing would not be allowed within the 300-acre Mountain Lakes Wilderness Study Area (see Table 2-11 in the draft).

Under this alternative, 122,300 acres of the 237,300 acres of federally-owned salable minerals would be open to mineral material disposal subject to standard requirements. Approximately 17,100 acres would be unavailable for mineral material disposal in order to protect important resource values and special investments. An additional 97,900 acres would be open to mineral material disposal subject to additional restrictions (see Table 2-12 in the draft).

## Rural Interface Areas

The 3,050 acres of BLM-administered lands located within ¼ mile of private lands in identified rural interface areas zoned for 1- to 20-acre lots would be managed for Visual Resource Management Class III objectives (see the Visual Resources section in Management Direction Common to Alternatives A through E for objectives and the Alternative C map in the draft). Customary forest and range management practices would be altered where feasible to mitigate the adjacent neighbors' concerns. Examples of management options include, but are not limited to, hand application rather than aerial application of herbicides and pesticides, inclusion of additional buffers for domestic water sources, and hand-piling slash for burning as opposed to broadcast burning. See Table 2-1 for management actions by alternative.

## Livestock Grazing

A moderate sustained yield of forage would be produced for livestock, wildlife, and the Pokegama Wild Horse Herd consistent with other uses and values (see Appendix 2-H in the draft for forage yields). A long-term juniper control program would be implemented to improve the potential for future forage needs and allocation, while emphasizing biological diversity. To improve riparian and wetland resources, the development and evaluation of grazing systems would continue.

## Wild Horses

See Management Direction Common to Alternatives A through E.

## Roads

Roads would be closed to coincide with Oregon Department of Fish and Wildlife regulations and constructed at a density consistent with resource protection and multiple use needs. Main roads would be the only roads within restoration and retention areas open to public use. No new roads would be constructed in these areas.

## Noxious Weed Control

See Management Direction Common to Alternatives A through E.

## Hazardous Materials

See Management Direction Common to Alternatives A through E.

## Fire

Up to 200 acres per year of prescribed burning would be allowed for site preparation and silvicultural fuel hazard reduction. Up to 740 acres per year of prescribed burning would be allowed for wildlife habitat and forage enhancement. If a specific criteria could be met and an approved burn plan developed, up to 6,000 acres per year of artificial and natural ignition prescribed fire (such as lightning strikes)



would be used to specifically enhance the ecosystem in the Gerber Block, with possible application on Stukel Mountain, Swan Lake Rim, Bryant Mountain, and the Klamath River area south of Highway 66. This could include an approved cooperative management plan with adjacent land owners. See Table 2-14 in the draft for a comparison of management actions by alternative.

## **Management Direction for Alternative D**

### **Objective**

Emphasize protection and re-establishment of northern spotted owl habitat and riparian ecosystems, along with management and enhancement of other values, such as dispersed nonmotorized recreation opportunities and scenic resources, while sustaining some timber and forage production.

### **Water Quality and Riparian Zones**

Substantial protection for wetlands and riparian zones would be provided along most streams and other water environments.

Riparian management areas would be established with the following average widths on each side of streams and other waters:

- ◆ 2nd order streams (see Glossary) - 60 feet;
- ◆ 3rd order - 140 feet;
- ◆ 4th order - 200 feet;
- ◆ 5th order - 280 feet;
- ◆ 6th order - 320 feet; and
- ◆ lakes, ponds, and other waters - 200 feet.

Actual riparian management area widths would be determined by on-the-ground riparian vegetation, terrain, and stream characteristics.

Livestock grazing management practices would provide for regrowth of riparian plants after use or would leave sufficient vegetation at the time of

grazing for maintenance of plant vigor and stream-bank protection. Most riparian ecosystems would be protected either through the use of intensive grazing management or by excluding livestock from those areas. Fall Creek and Tunnel Creek would be fenced to exclude livestock use.

### **Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity**

On the west side, 13,430 acres of forest land would be set aside from timber harvest and new road construction. These areas would be managed according to recommendations of the Interagency Scientific Committee's Conservation Strategy for the northern spotted owl. Of this land, 2,020 acres are currently old growth and 4,050 acres are mature forest. The east side does not contain designated northern spotted owl habitat; therefore, no areas would be set aside to be managed under the Interagency Scientific Committee's Strategy.

BLM-administered non-forest lands would be managed to protect the diversity of native plant communities that would naturally occur on those lands (see the Chapter 3 Vegetation section). Management would also enhance or restore these communities through the maintenance or reintroduction of natural ecological processes, such as fire (see the Fire and Wildlife sections). These actions would contribute to the habitat component of biological diversity necessary for the array of native wildlife species dependent on those communities. Such diversity would not be provided by the more intensively managed private and state lands composing the balance of the landscape.

### **Timber**

Forest lands in the nonsuitable woodland and suitable woodland timber production capability classification categories would not be subject to planned harvest (see the Alternative D map in the draft). Other forest lands not subject to planned harvest would include riparian management areas, existing recreation sites, potential high-value recreation sites, existing pockets of old growth both adjacent to and accessible from existing or potential recreation sites, existing and potential areas of critical environmental concern, and areas required for protection of special status species. On the west side, those forest lands not subject to planned timber harvest total 12,500 acres, of which

2,000 acres currently are old growth and 4,000 acres are mature forest. On the east side, they total 1,400 acres, of which 200 acres are old growth and 700 acres are mature forest.

On the west side, 34,200 acres would be available for restricted timber production. On the east side, 14,700 acres would be available for restricted timber production. Restrictions on timber production include protection of visual resources on lands inventoried as Visual Resource Management Class II, and stand retention to meet the 50-11-40 rule (see Glossary) under northern spotted owl guidelines (see Table 2-2 in the draft). Projected ten-year timber harvest acreage and other timber management activities are shown in Table 2-1. The planned annual timber sale quantity for the expected life of the plan would be 1.7 million cubic feet (9.6 million board feet Scribner short log) for the west side, and 0.25 million cubic feet (1.35 million board feet Scribner short log) for the east side.

## Special Status (Including Threatened and Endangered) Species Habitats

BLM management and permitting actions would be modified or constrained to the extent considered necessary to avoid contributing to the need to list federal candidate category 1 and 2, state listed, state candidate, and Bureau sensitive species. If any of the cited species are suspected to be present in the area proposed for a specific site-disturbing activity, field surveys would focus on those species; if their presence is identified, their habitat would be protected from identified potential site disturbing activities of a specific management action.

Northern spotted owl habitat conservation areas would be established as shown on the Alternative D map in the draft. Timber harvest would not be planned in these areas, and logging and other silvicultural activities (except stand regeneration) would not be conducted. Road construction in habitat conservation areas would take place only where no feasible alternatives exist. When roads are constructed in habitat conservation areas, they would be located and engineered to minimize loss and alteration of northern spotted owl habitat and would not be located within ¼ mile of the activity center of any northern spotted owl pair. Some collector and all local roads could be closed. Reforestation activities on previously harvested lands in habitat conservation areas would encourage a mix of species in the regenerating forest. See the 50-11-40 rule in the Glossary.

If Bureau assessment species are suspected in an area proposed for a specific site-disturbing activity, clearances would be done. If these species are found, then their habitats would be conserved where possible.

## Wildlife Habitats

On lands available for timber harvest, snags, live green cull trees, and green merchantable trees would be retained to provide nest sites for a minimum of 60 percent of optimal cavity nester populations, both for present needs and long-term sustainability. This retention level corresponds to approximately 1.9 snags per acre (or 190 snags per 100 acres) on west side and 1.4 snags per acre (or 140 snags per 100 acres) in forested habitat on the east side.

Timber harvests on the west side would be designed to retain (where available) enough dead and down material to meet Old Growth Definition Task Group standards, which vary according to plant community series. For Douglas fir stands on mixed conifer sites, the minimum standards would be to retain 10 tons of dead and down logs per acre, including 2 pieces per acre 24 inches in diameter and longer than 50 feet. Minimum standards for east side timber harvests in ponderosa pine stands would be to retain, where available, dead and down materials at approximately 5 tons per acre including 3 to 6 pieces per acre at least 12 inches in diameter on the large end and at least 8 feet long.

Minimum standards for east side timber harvests in ponderosa pine stands would be to retain, where available, 3 conifer snags or green culls per acre with a diameter at breast height of greater than 14 inches; dead and down materials would be retained at approximately 5 tons per acre including 3 to 6 pieces per acre at least 12 inches in diameter on the large end and at least 8 feet long.

In accordance with other management activities, road system management would have a goal of reducing open road density to 1.5 miles or less per section. Existing seasonal off-highway vehicle closures in big game winter ranges would remain in effect throughout the plan. Roads in other sensitive wildlife habitats could be evaluated for possible seasonal closures to general public travel; however, these roads could remain open for administrative use, forest product removal, and access for mineral exploration and development. See the Recreation section for more detail.

Special habitats would be buffered from timber harvest and other surface disturbing activities. Table 2-4 in the draft shows special habitat buffers by alternative (see also Table 2-3 in the draft for management of other wildlife habitat).

As opportunities arise, private lands within the biodiversity corridors would be obtained through exchange or other mutual agreement to improve connectivity for wildlife movement within these corridors.

## Special Areas

The following areas would be designated as areas of critical environmental concern:

- ◆ Yainax Butte - 720 acres;
- ◆ Miller Creek - 2,000 acres;
- ◆ Spencer Creek - 320 acres;
- ◆ Klamath River Canyon - 4,960 acres;
- ◆ Pacific Crest Trail - 620 acres in the Klamath Falls Resource Area;
- ◆ Tunnel Creek Wetlands - 280 acres;
- ◆ Bumpheads - 50 acres; and the
- ◆ Surveyor Forest Area - 150 acres.

See Table 2-6 in the draft for proposed management of potential areas of critical environmental concerns and other areas of special interest (see also the Alternative D map in the draft).

Other areas of special interest that would receive special management include: Alkali Lake - 240 acres would be managed for riparian and aquatic habitat and waterfowl migration; and Clover Creek Educational Area - 30 acres would be managed for scientific and educational purposes.

The Old Baldy proposed research natural area would be considered for designation as an research natural area/areas of critical environmental concern if it met an empty cell need.

If the opportunity arose, private lands along Alkali Lake and/or the Tunnel Creek Wetlands would be obtained through exchange or other mutual agreement. Cooperative management of private lands along the Tunnel Creek Wetlands would also be pursued.

## Recreation

Informational, educational, and recreational opportunities would be developed, including development of nature or multi-purpose trails in one or more of the following areas: Surveyor recreation site (Johnson Creek), Spencer Creek area, Hamaker Mountain area, Stukel Mountain area, Swan Lake Rim, Gerber Block area (Miller Creek and Potholes), and/or Bryant Mountain area; development of overnight camping or day use facilities could occur in the Hamaker Mountain area, Spencer Creek area, Bryant Mountain area, Fox Lake, Johnson Prairie, and/or Klamath River Complex special recreation management area; and development of interpretive sites and facilities for wildlife, historic or cultural sites, or other natural resources in the Surveyor recreation site, Hamaker Mountain area, and/or along Highway 66. See Table 2-1 and Table 2-7 in the draft for sites, trails, and off-highway vehicle closures. In addition to the off-highway vehicle designations listed under Management Direction Common to Alternatives A through E, the following *existing* off-highway vehicle designations would also remain unchanged.

- ◆ Lower Klamath Hills Wildlife area - 1,390 acres **closed**;
- ◆ Klamath Deer Winter Range - 7,990 acres **limited** (seasonal closure from November 1 to April 15);
- ◆ Gerber Bloc - 35,400 acres **limited** (seasonal closure from November 1 to April 15);
- ◆ Stukel Mountain - 11,550 acres **limited** (seasonal closure from November 1 to April 25); and
- ◆ Pokegama Wildlife Area - 7,600 acres **limited** (seasonal closure from November 1 to April 15).

The following areas would receive *new* off-highway vehicle closure designations: areas where water quality is being adversely affected; areas where soil erosion or other significant resource damage is occurring; Spencer Creek area of critical environmental concern; Miller Creek area of critical environmental concern; Tunnel Creek Wetlands area of critical environmental concern; Hamaker Mountain; Pacific Crest Trail area of critical environmental concern and Old Baldy research natural area; Swan Lake Rim; Alkali Lake; Bumpheads area of critical environmental concern; and Gerber Reservoir. Off-highway vehicle use would be limited to designated roads and trails in the Klamath River Canyon area of critical environmental concern, Stukel Mountain area, Bryant Mountain

area, Gerber Block, Yainax Butte area of critical environmental concern, and the Surveyor Mountain area. Off-highway vehicle use in the Bryant Mountain area would be limited through additional seasonal closures.

Table 2-7 in the draft shows proposed recreation management designations by alternative for recreation sites and areas (see also the Alternative D map in the draft). The following additional recreation management strategies are proposed:

- ◆ For the Pacific Crest National Scenic Trail special recreation management area, a scenic ¼-mile corridor (Visual Resource Management Class II management) would be provided on either side of the trail. The trail corridor (620 acres) would be designated an area of critical environmental concern (See the Special Areas section).
- ◆ For the Surveyor recreation site, adjacent old growth forest would be retained for dispersed nonmotorized recreation opportunities.
- ◆ The existing recreation area management plan for the Klamath River Complex special recreation management area would be updated to reflect a change in management to include semi-primitive nonmotorized recreation opportunities (see Appendix 2-D in the draft). The BLM would provide fire-safe, approved, and developed group campsites. The Topsy recreation site and BLM campground in the Klamath Canyon would be improved and barrier-free access provided. A cooperative management agreement with Klamath and Siskiyou counties could be entered into to provide minimum annual maintenance on Topsy Road. The Pacific Power and Light Company access road would be closed to vehicles beyond the BLM campground.
- ◆ In the Hamaker Mountain area a recreation area management plan would be developed, with an emphasis on nonmotorized winter sports.
- ◆ In the Stukel Mountain area a recreation area management plan would be developed to include nonmotorized recreation opportunities. Development of hang gliding facilities would be considered.
- ◆ In the Gerber Block a coordinated resource management plan, including semi-primitive motorized recreation opportunities, would be developed. Interpretive hiking trails and facilities to enhance viewing of wildlife and riparian projects would be developed.

- ◆ In Spencer Creek a recreation area management plan including nonmotorized recreation activities would be developed. A walk-in rest area at Clover Creek would be developed. Resource management would highlight public education about the coordinated resource management plan, the role of fire in ecosystem processes, illegal wood cutting, and other resource activities.
- ◆ In Swan Lake Rim a recreation area management plan, including semi-primitive nonmotorized recreation opportunities, would be developed.
- ◆ Management of the Bryant Mountain area would include nonmotorized recreation opportunities. Semi-developed camping facilities would be developed.

To retain options for future development of high-value potential recreation sites, trails, and sightseeing opportunities no timber sales other than salvage sales of dead and dying timber would be made during the life of this plan in the areas listed in Tables 3-24, 3-26, and 3-27 in the draft. Exceptions would be made if a natural catastrophe (such as fire or windstorm) destroyed the high-value recreation potential of the area.

## Wild and Scenic Rivers

Segment 2 of the upper Klamath River (11.0 miles) would be found suitable for designation as a scenic river and would be managed under interim protective management as described under the Management Direction Common to Alternatives A through E section and in Appendix 2-E in the draft. See Table 2-15 in the draft for suitability of eligible river segments. See also the Alternative D map in the draft.

## Wilderness Study Areas

If not designated as wilderness, the Mountain Lakes Wilderness Study Area (330 acres) would be managed for retention and maintenance of old growth, mature forest, and habitat diversity (see the Alternative D map in the draft).

## Visual Resources

All lands except rural interface areas (see the Rural Interface Area section) would be managed as inventoried for their visual characteristics (see the Alternative D map in the draft). Acres to be managed for each visual resource management class are shown on Table 2-1.



## Cultural Resources

The following affirmative measures would be implemented but would be susceptible to change based on the accumulation of new data.

- ◆ Most eligible cultural resource sites and districts would be nominated to the National Register of Historic Places. The exact number and acreage of such sites would be determined during the nomination process.
- ◆ Cultural resource management plans would be developed for the Gerber Block and the upper Klamath River Canyon.
- ◆ An updated and expanded Class I cultural resource survey would be completed for the planning area (see Appendix 3-F in the draft).
- ◆ A systematic inventory of areas which are likely to contain cultural resources would be conducted.
- ◆ Systematic testing and evaluation of archaeological sites would be performed to assess their potential for contributing to public and scientific uses.
- ◆ A program of post-project monitoring would be developed to determine if initial Class III surveys have been accurate.
- ◆ The Klamath Falls Resource Area would attempt to obtain through exchange or other mutual agreement private lands containing known and manageable cultural resources that are adjacent to public lands.
- ◆ Physical site-protection and stabilization measures, such as soil erosion control and limiting public access, would be implemented to reduce deterioration of endangered sites.
- ◆ Native American traditional use areas would be protected by maintaining the natural and cultural characteristics that make them significant.
- ◆ The Klamath Tribe would be contacted in an effort to enter into negotiations to develop a memorandum of understanding to provide for tribal input on BLM projects and to identify and address tribal concerns. Other potentially concerned Native American groups, such as the Modoc Tribe of Oklahoma, the confederated Modoc and Paiute tribes, and the Shasta Nation of California, would be contacted to see if, and to what extent, they would be interested in providing input on projects on BLM lands.
- ◆ Informational and educational opportunities would be provided to increase public awareness of the cultural resource program.

## Land Tenure

Land exchanges would be made to benefit one or more of the resources managed. Exchanges involving disposal of timber or forage lands to obtain lands of greater nontimber or nonforage values would be emphasized. Sales of lands other than available commercial forest lands or range lands that meet criteria (1) or (2) of the Federal Land Policy and Management Act section 203(a) would be pursued.

In general, no lands would be leased; however, leases and conveyances under the Recreation and Public Purposes Act could be made in zone 2 and 3 lands to provide appropriate services or facilities to the public.

## Hydroelectric and Alternative Energy Projects

The Salt Caves hydroelectric project right-of-way application would neither be accepted nor denied until the Congress acts on designation of the Klamath River as scenic under the National Wild and Scenic River Act.

Issuance of a rights-of-way grant for proposed alternative energy projects that are or can be made consistent with the management direction for other resources would be acceptable under this alternative. Rights-of-way would be issued for the above projects only if they would not significantly affect other resource uses.

## Rights-of-Way

See Management Direction Common to Alternatives A through E.

## Access

See Management Direction Common to Alternatives A through E.

## Withdrawals

See Management Direction Common to Alternatives A through E.

## Energy and Minerals

Under this alternative, 164,600 acres of the 235,900 acres of federally-owned locatable minerals would be open to mining claim location and operation subject to standard requirements. Another 65,500 acres would be subject to additional restrictions. About 4,300 acres would continue to be withdrawn from mineral entry, with an additional 1,500 acres withdrawn from nonmetalliferous mineral entry (see Table 2-10 in the draft).

Under this alternative, 117,600 acres of the 238,700 acres of federally-owned oil and gas and 237,300 acres of federally-owned geothermal resources would be available for leasing subject to standard requirements. An additional 109,300 acres of oil and gas, and 107,900 acres of geothermal resources would be open to leasing subject to additional restrictions. No surface occupancy stipulations would be imposed on another 11,500 acres of oil and gas and geothermal resources. Leasing would not be allowed within the 300-acre Mountain Lakes Wilderness Study Area (see Table 2-11 in the draft).

Under this alternative, 117,600 acres of the 237,300 acres of federally-owned salable minerals would be open to mineral material disposal subject to standard requirements. About 17,700 acres would be unavailable for mineral material disposal in order to protect important resource values and special investments. An additional 102,000 acres would be open to mineral material disposal subject to additional restrictions (see Table 2-12 in the draft).

## Rural Interface Areas

The 3,050 acres of BLM-administered lands within ¼ mile of private lands in rural interface areas zoned for 1- to 20-acre lots would be managed for Visual Resource Management Class II objectives (see the Visual Resources section in the Management Direction Common to Alternatives A through E for objectives and the Alternative D map in the draft). There would be no herbicide spraying or clearcutting in rural interface areas and fuel hazards would be reduced with methods other than prescribed burning. See Table 2-1 for management actions by alternatives.

## Livestock Grazing

A sustained yield of livestock forage would be produced while providing a high amount of forage both to wildlife

and the Pokedama Wild Horse Herd (see Appendix 2-H in the draft for forage yields). Grazing systems would continue to be developed on section 3 and 15 lands to improve riparian and wetland resources, while providing for a natural level of biological diversity (see the Livestock Grazing section in Chapter 3).

Livestock enclosures could be built to provide for riparian and wetland improvement of vegetative communities.

## Wild Horses

See Management Direction Common to Alternatives A through E.

## Roads

Roads would be closed to coincide with Oregon Department of Fish and Wildlife regulations, and constructed to match timber harvest levels.

## Noxious Weed Control

See Management Direction Common to Alternatives A through E.

## Hazardous Materials

See Management Direction Common to Alternatives A through E.

## Fire

Up to 350 acres per year of prescribed burning would be allowed for site preparation and silvicultural fuel hazard reduction. Up to 720 acres per year of prescribed burning would be allowed for wildlife habitat and forage enhancement. If a specific criteria could be met and an approved burn plan developed, up to 8,100 acres per year of artificial and natural ignition prescribed fire (such as lightning strikes) would be used specifically to enhance the ecosystem in the Gerber Block, with possible application on Stukel Mountain, Swan Lake Rim, Bryant Mountain, and the Klamath River area south of Highway 66. This could include an approved cooperative management plan with adjacent land owners. See Table 2-14 in the draft for a comparison of management actions by alternative.



## Management Direction for Alternative E

### Objective

Emphasize protection of older forests, native plant communities, and management and enhancement of other values, such as dispersed nonmotorized recreation opportunities and scenic resources.

### Water Quality and Riparian Zones

All riparian zones and wetlands would be managed to maintain and improve water quality and fisheries habitat through protection of native riparian plant communities. Riparian zones would be protected or enhanced to achieve a healthy and productive ecological condition for maximum long-term benefits and values.

Riparian management areas would be established with the following average widths on each side of streams and other waters:

- ◆ 1st order streams (see Glossary) - 50 feet;
- ◆ 2nd order - 60 feet;
- ◆ 3rd order - 200 feet;
- ◆ 4th order - 200 feet;
- ◆ 5th order - 280 feet;
- ◆ 6th order - 320 feet; and
- ◆ lakes, ponds, and other waters - 400 feet.

Actual riparian management area widths would be determined by on-the-ground riparian vegetation, terrain, and stream characteristics.

Livestock grazing management practices would provide for regrowth of riparian plants after use or would leave sufficient vegetation at the time of grazing for maintenance of plant vigor and stream-bank protection. All riparian ecosystems would be protected either through the use of intensive grazing management or by excluding livestock from those areas. The following riparian areas would be fenced to exclude livestock use: Fall Creek, Tunnel Creek, the unnamed stream in the Johnson Prairie Allotment, and Long Lake.

### Retention, Maintenance, and/or Re-Establishment of Old Growth, Mature Forest, and Habitat Diversity

Most BLM-administered forest lands would not be subject to planned timber harvest, but would be available for management of biological diversity, including old growth characteristics. Lands excluded from planned harvest include forest lands in the nonsuitable and suitable woodland timber production capability classification categories, plus suitable commercial forest land on site V lands and the fragile gradient-restricted component of the fragile suitable timber production capability classification category. Also, forest lands allocated for riparian zones, wild and scenic river corridors, undisturbed protection of special status species, and areas of critical environmental concern would not be subject to planned harvest (see the Alternative E map in the draft).

Other lands not available for timber harvest include all forest stands greater than 150 years old and forest lands within 400 feet of stands greater than 150 years old. This will serve to assist in maintaining natural ecological elements, protect the older stands from edge effect and natural disaster, and interconnect them into a sustainable network. Additional west side lands not available for timber harvest include all forest lands classified as suitable owl habitat that are within two miles of each northern spotted owl nest or habitat core occupied in recent years, Visual Resource Management I lands, and developed recreation sites. Forty-acre blocks of forest lands in each 640-acre section where the BLM manages at least half of the land would be designated to provide habitat for amphibians, nesting goshawks, and pileated woodpeckers. This would only apply to lands not included in the previous categories.

On the west side, those forest lands not subject to planned timber harvest total 44,870 acres, of which 5,630 acres are currently old growth and 10,530 acres are mature forest. On the east side, these forest lands total 15,950 acres, of which 1,600 acres are currently old growth and 3,000 acres are mature forest.

BLM-administered non-forest lands would be managed to protect the diversity of native plant communities that naturally occur on those lands (see Chapter 3, Vegetation section). Management would also enhance or restore these communities through the maintenance or reintroduction of natural ecological processes,

such as fire (see Fire and Wildlife sections). These actions would contribute to the habitat component of biological diversity necessary for the array of native wildlife species dependent on those communities. Such diversity would not be provided on the more intensively managed private and state lands composing the balance of the landscape. Special habitat features would be buffered to the specifications designated in other relevant sections of this Chapter (see the Special Status Species, Riparian, Wildlife, and Special Areas sections).

## Timber

Forest lands in the nonsuitable and suitable woodland categories, plus suitable commercial forest land on site V lands and the fragile gradient-restricted component of the fragile suitable timber production capability classification category, would not be subject to planned timber harvest (see the Alternative E map in the draft).

On the west side, 600 acres would be available for intensive timber production, and 2,200 acres for restricted timber production. On the east side, 200 acres would be available for intensive timber production, and none for restricted production. See Table 2-1.

Projected ten-year timber harvest acreage and other timber management activities are shown in Table 2-1. The planned annual timber sale quantity for the expected life of the plan would be 0.18 million cubic feet (1.0 million board feet Scribner short log) for the west side, and 0.004 million cubic feet (0.021 million board feet Scribner short log) for the east side.

## Special Status (Including Threatened and Endangered) Species Habitats

Bureau management and permitting actions would be modified or constrained to the extent considered necessary to avoid contributing to the need to list federal candidate category 1 and 2, state listed, state candidate, and Bureau sensitive species. If any of these species are suspected to be present in an area proposed for a specific site-disturbing activity, field survey would focus on those species. If their presence is identified, their habitat would be protected from identified potential site-disturbing activities of a specific management action. See Table 2-2 in the draft for a comparison of management actions by alternative.

If Bureau assessment species are suspected in an area proposed for a specific site-disturbing activity, clearances would be done. If these species are found, then their habitats would be conserved where possible.

## Wildlife Habitats

On lands available for timber harvest, snags, live green cull trees, and green merchantable trees would be retained to provide nest sites for a minimum of 60 percent of optimal cavity nester populations, both for present needs and long-term sustainability. This retention level corresponds to approximately 1.9 snags per acre (or 190 snags per 100 acres) on the west side and 1.4 snags per acre (or 140 snags per 100 acres) in forested habitat on the east side.

Timber harvests on the west side would be designed to retain (where available) enough dead and down material to meet Old Growth Definition Task Group standards, which vary according to plant community series. For Douglas fir stands on mixed conifer sites, the minimum standards would be to retain 10 tons of dead and down logs per acre, including 2 pieces per acre 24 inches in diameter and longer than 50 feet. Minimum standards for east side timber harvests in ponderosa pine stands would be to retain, where available, dead and down materials at approximately 5 tons per acre including 3 to 6 pieces per acre at least 12 inches in diameter on the large end and at least 8 feet long.

In accordance with other management activities, road system management would have a goal of reducing open road density to 1.5 miles or less per section. Existing seasonal off-highway vehicle closures in big game winter ranges would remain in effect throughout the plan. Roads in other sensitive wildlife habitats could be evaluated for possible seasonal closures to general public travel; however, these roads could remain open for administrative use, forest product removal, and access for mineral exploration and development. See the Recreation section for more detail.

Special habitats would be buffered from surface disturbance and timber harvest. Table 2-4 in the draft shows special habitat buffers by alternative (see also Table 2-3 in the draft for management of other wildlife habitat).

## Special Areas

The following areas would be designated as areas of critical environmental concern:

## Chapter 2 - Description of the Alternatives

- ◆ Yainax Butte - 720 acres;
- ◆ Miller Creek - 2,000 acres;
- ◆ Spencer Creek - 320 acres;
- ◆ Klamath River Canyon - 4,960 acres;
- ◆ Pacific Crest Trail - 620 acres in the Klamath Falls Resource Area;
- ◆ Tunnel Creek Wetlands - 280 acres;
- ◆ Bumpheads - 50 acres; and
- ◆ Surveyor Forest Area - 150 acres.

See Table 2-6 in the draft for proposed management of potential areas of critical environmental concerns and other areas of special interest (see also the Alternative E map in the draft).

Other areas of special interest that would receive special management include: Alkali Lake - 240 acres would be managed for riparian and aquatic habitat and waterfowl migration; and Clover Creek Educational Area - 30 acres would be managed for scientific and educational purposes.

The Old Baldy proposed research natural area would be considered for designation as an research natural area/area of critical environmental concern if it met an empty cell need.

If the opportunity arose, private lands along Alkali Lake and/or the Tunnel Creek Wetlands would be obtained through exchange or other mutual agreement. Cooperative management of private lands along the Tunnel Creek Wetlands would also be pursued.

## Recreation

Informational, educational, and recreational opportunities would be developed, including development of nature or multi-purpose trails in one or more of the following areas: Surveyor recreation site (Johnson Creek), Spencer Creek area, Hamaker Mountain area, Stukel Mountain area, Swan Lake Rim, Gerber Block area (Miller Creek and Potholes), and/or Bryant Mountain area; development of overnight camping or day-use facilities could occur in the Hamaker Mountain area, Spencer Creek area, Bryant Mountain area, Fox Lake, Johnson Prairie, and/or Klamath River Complex special recreation management area; Bryant Mountain area, and development of interpretive sites and facilities for wildlife, historic or cultural sites, or other natural resources in Surveyor recreation site, Hamaker Mountain area, Spencer Creek area, Swan Lake Rim, and/or along Highway 66. See Table 2-1 and Table 2-1 in the draft for sites, trails, and off-highway vehicle closures.

In addition to the off-highway vehicle designations listed under the Management Direction Common to Alternatives A through E, the following existing off-highway vehicle designations would also remain unchanged.

- ◆ Lower Klamath Hills Wildlife Area - 1,390 acres **closed**;
- ◆ Klamath Deer Winter Range - 7,990 acres **limited** (seasonal closure from November 1 to April 15);
- ◆ Gerber Block - 35,400 acres **limited** (seasonal closure from November 1 to April 15);
- ◆ Stukel Mountain - 11,550 acres **limited** (seasonal closure from November 1 to April 25); and
- ◆ Pokegama Wildlife Area - 7,600 acres **limited** (seasonal closure from November 1 to April 15).

The following areas would receive new off-highway vehicle closure designations: areas where water quality is being adversely affected; areas where soil erosion or other significant resource damage is occurring; Spencer Creek area of critical environmental concern; Miller Creek area of critical environmental concern; Tunnel Creek Wetlands area of critical environmental concern; Hamaker Mountain; Pacific Crest Trail area of critical environmental concern and Old Baldy research natural area; Swan Lake Rim; Alkali Lake; Bumpheads area of critical environmental concern; and Gerber Reservoir. Off-highway vehicle use would be limited to designated roads and trails on all public lands south of Highway 66, and in the Surveyor Mountain area, Bryant Mountain, Gerber Block, and Yainax Butte area of critical environmental concern. Off-highway vehicle use in the Bryant Mountain area would be limited through additional seasonal closures.

Table 2-7 in the draft shows proposed recreation management designations by alternative for recreation sites and areas (see the Alternative E map in the draft). The following additional recreation management strategies are proposed:

- ◆ For the Pacific Crest National Scenic Trail Special Recreation Management Area a scenic ¼-mile corridor (Visual Resource Management Class II management) would be provided on either side of the trail. The trail corridor (620 acres) would be designated an area of critical environmental concern. (See the Special Areas section).

- ◆ For the Surveyor recreation site, adjacent old growth forest would be retained for dispersed nonmotorized recreation opportunities (see Appendix 2-D in the draft).
- ◆ The existing recreation area management plan for the Klamath River Complex Special Recreation Management Area would be updated to reflect a change in management to include semi-primitive nonmotorized recreation opportunities. The BLM would provide fire-safe, approved, and developed group campsites. The Topsy recreation site and BLM campground in the Klamath Canyon would be improved and barrier-free access provided. A cooperative management agreement with Klamath and Siskiyou counties could be pursued to provide minimum annual maintenance on Topsy Road. The Pacific Power and Light Company access road would be closed to vehicles beyond the BLM campground.
- ◆ In the Hamaker Mountain area a recreation area management plan would be developed, with an emphasis on nonmotorized winter sports.
- ◆ In the Stukel Mountain area a recreation area management plan would be developed to include semi-primitive nonmotorized recreation opportunities. Development of hang gliding facilities would be considered.
- ◆ In the Gerber Block a coordinated resource management plan, including semi-primitive nonmotorized recreation opportunities, would be developed. Interpretive hiking trails and facilities to enhance viewing of wildlife and riparian projects would be developed.
- ◆ In Spencer Creek a recreation area management plan including nonmotorized recreation activities would be developed. A walk-in rest area at Clover Creek would be developed. Resource management would highlight public education about the coordinated resource management plan, the role of fire in ecosystem processes, illegal wood cutting, and other resource activities.
- ◆ In Swan Lake Rim a recreation area management plan, including semi-primitive nonmotorized recreation opportunities, would be developed.
- ◆ Management of the Bryant Mountain area would include nonmotorized recreation opportunities. Semi-developed camping facilities would be developed.

To retain options for future development of high-value potential recreation sites, trails, and sightseeing opportunities, no timber sales other than salvage sales of dead and dying timber would be made during the life of this plan in the areas listed in Tables 3-24, 3-26, and 3-27 in the draft. Exceptions would be made if a natural catastrophe (such as fire or wind-storm) destroyed the high-value recreation potential of the area.

## Wild and Scenic Rivers

A total of 34.2 miles, including Miller Creek (6.5 miles), Barnes Valley Creek (5.6 miles), Spencer Creek (3.0 miles), segments A and C of Antelope Creek (5.4 and 2.7 miles, respectively), and segment 2 of the upper Klamath River (11.0 miles), would be found suitable for designation as scenic rivers and would be managed under interim protective management as described under the Management Direction Common to Alternatives A through E section and in Appendix 2-E in the draft. See Table 2-15 in the draft for suitability of eligible river segments (see also the Alternative E map in the draft).

## Wilderness Study Areas

If not designated as wilderness, the Mountain Lakes Wilderness Study Area (330 acres) would be managed for retention and maintenance of old growth, mature forest, and habitat diversity (see the Alternative E map in the draft).

## Visual Resources

Visual Resource Management Class I management would be provided for all BLM-administered lands adjacent to (within ¼ mile) developed recreation sites, state and federal highways, state scenic waterways, and rivers designated under the National Wild and Scenic Rivers Act. Visual Resource Management Class II management would be provided for lands in identified rural interface areas, and all remaining lands inventoried as Visual Resource Management Class II (see the Alternative E map in the draft). Land inventoried as Visual Resource Management Class III or IV would be managed as Class III. Acres to be managed for each Visual Resource Management class are shown on Table 2-1.



## Cultural Resources

The following affirmative measures would be implemented but would be susceptible to change based on the accumulation of new data.

- ◆ All eligible cultural resource sites would be nominated to the National Register of Historic Places. The exact number and acreage of such sites would be determined during the nomination process.
- ◆ Cultural resource management plans would be developed for all archaeological sites and districts.
- ◆ An updated and expanded Class I cultural resource survey would be completed for the planning area (see Appendix 3-F in the draft).
- ◆ A systematic inventory of all areas that may contain cultural resources would be completed.
- ◆ Systematic testing and evaluation of all archaeological sites would be performed to assess their potential for contributing to public and scientific uses.
- ◆ A program of post-project monitoring would be developed for all Class III surveys to determine if they have been accurate.
- ◆ The Klamath Falls Resource Area would attempt to obtain through exchange or other mutual agreement private lands containing known and manageable cultural resources that are adjacent to public lands.
- ◆ Physical site protection and stabilization measures, such as soil erosion control and limiting public access, would be implemented to reduce deterioration of all endangered sites.
- ◆ Native American traditional use areas would be protected by maintaining the natural and cultural characteristics that make them significant.
- ◆ The Klamath Tribe would be contacted in an effort to enter into negotiations to develop a memorandum of understanding to provide for tribal input on BLM projects and to identify and address tribal concerns. Other potentially concerned Native American groups, such as the Modoc Tribe of Oklahoma, the confederated Modoc and Paiute tribes, and the Shasta Nation of California, would be contacted to see if, and to what extent, they would be interested in providing input on projects on BLM lands.
- ◆ Informational and educational opportunities would be provided to increase public awareness of the cultural resource program.

## Land Tenure

Land exchanges would be made to benefit one or more of the resources managed. Exchanges involving disposal of timber or forage lands to obtain lands of greater nontimber or nonforage values would be emphasized. Sales of lands other than available commercial forest lands or range lands that meet criteria (1) or (2) of the Federal Land Policy and Management Act, section 203(a), would be pursued.

In general, no lands would be leased; however, leases and conveyances under the Recreation and Public Purposes Act could be made in zone 2 and 3 lands to provide appropriate services or facilities to the public.

## Hydroelectric and Alternative Energy Projects

All rights-of-way for proposed hydroelectric or alternative energy projects that would conflict with any other resource value would be denied.

## Rights-of-Way

See Management Direction Common to Alternatives A through E.

## Access

See Management Direction Common to Alternatives A through E.

## Withdrawals

See Management Direction Common to Alternatives A through E.

## Energy and Minerals

Under this alternative, 156,700 acres of the 235,900 acres of federally-owned **locatable** minerals would be open to mining claim location and operation subject to standard requirements. Another 73,400 acres would be subject to additional restrictions. About 4,300 acres would continue to be withdrawn from mineral entry, with an additional 1,500 acres withdrawn from nonmetalliferous mineral entry (see Table 2-10 in the draft).

Under this alternative, 100,200 acres of the 238,700 acres of federally-owned oil and gas and 237,300 acres of federally-owned geothermal resources would be available for leasing subject to standard requirements. An additional 126,500 acres of oil and gas, and 125,100 acres of geothermal resources would be open to leasing subject to additional restrictions. No surface occupancy stipulations would be imposed on another 11,700 acres of oil and gas and geothermal resources. Leasing would not be allowed within the 300-acre Mountain Lakes Wilderness Study Area (see Table 2-11 in the draft).

Under this alternative, 100,000 acres of the 237,300 acres of federally-owned salable minerals would be open to mineral material disposal subject to standard requirements. About 32,400 acres would be unavailable for mineral material disposal in order to protect important resource values and special investments. An additional 104,900 acres would be open to mineral material disposal subject to additional restrictions (see Table 2-12 in the draft).

## Rural Interface Areas

The 4,500 acres of BLM-administered lands within ½ mile of private lands in rural interface areas would be managed for Visual Resource Management Class II objectives (see the Visual Resource section in Management Direction Common to Alternatives A through E for objectives, also see the Alternative E map in the draft). There would be no herbicide spraying or clearcutting in rural interface areas, and fuel hazards would be reduced with methods other than prescribed burning. See Table 2-1 for management actions by alternative.

## Livestock Grazing

A sustained yield of livestock forage would be produced while providing the highest amount of forage both to wildlife and to the Pokegama Wild Horse Herd (see Appendix 2-H in the draft). Grazing systems would continue to be developed on section 3 and 15 lands (see Livestock Grazing section in Chapter 3) to improve riparian and wetland resources, while providing for a natural level of biological diversity.

Livestock enclosures could be built to provide for riparian and wetland improvement of vegetative communities.

## Wild Horses

See Management Direction Common to Alternatives A through E.

## Roads

Roads would be closed to coincide with Oregon Department of Fish and Wildlife regulations, and constructed to match timber harvest levels.

## Noxious Weeds

See Management Direction Common to Alternatives A through E.

## Hazardous Materials

See Management Direction Common to Alternatives A through E.

## Fire

Up to 40 acres per year of prescribed burning would be allowed for site preparation and silvicultural fuel hazard reduction. Up to 650 acres per year of prescribed burning would be allowed for wildlife habitat and forage enhancement. If a specific criteria can be met and an approved burn plan developed, up to 10,300 acres per year of artificial and natural ignition (such as lightning strikes) prescribed fire would be used to specifically enhance the ecosystem in the Gerber Block, with possible application on Stukel Mountain, Swan Lake Rim, Bryant Mountain, and the Klamath River area south of Highway 66. This could include an approved cooperative management plan with adjacent landowners. See Table 2-14 in the draft for a comparison of management actions by alternative.



## Coordination and Consultation

The implementation of this Resource Management Plan and the overriding Supplemental Environmental Impact Statement Record of Decision, calls for a high level of coordination and cooperation among agencies. A formal procedure for interagency coordination has been created by a Memorandum of Understanding for Forest Ecosystem Management that has been entered into by the White House Office on Environmental Policy, the Department of the Interior, the Department of Agriculture, the Department of Commerce, and the Environmental Protection Agency. The Memorandum of Understanding created several interagency groups, including the Interagency Steering Committee, Regional Interagency Executive Committee, and Regional Ecosystem Office. A detailed description of these groups is included in Attachment A, Section E, Implementation, of the Supplemental Environmental Impact Statement Record of Decision.

Consultation under the Endangered Species Act will emphasize an integrated ecosystem approach. This will include involving the Fish and Wildlife Service and the National Marine Fisheries Service in all relevant implementation planning, so their views can be made known. Actions proposed to implement this Resource Management Plan will undergo consultation, either formal or informal, as appropriate. Consultation for the northern spotted owl on activities that are consistent with the standards and guidelines of the Supplemental Environmental Impact Statement Record of Decision and that would not result in "take" of a listed species is expected to be informal. If take would result, incidental take statements would be provided through formal consultation.

Concurrent coordination with the Environmental Protection Agency and the Oregon Department of Environmental Quality on water quality standards and beneficial use requirements of the Clean Water Act will minimize project impacts. Similar coordination with the Environmental Protection Agency, Department of Environmental Quality, and the U.S. Forest Service on minimizing impacts of emissions from prescribed burning will occur.

## Use of the Completed Plan

Many of the management activities described in this Resource Management Plan/Environmental Impact Statement would be accomplished through contracts and permits. Performance standards are developed and included in a contract or permit. They require the contractor or permittee to comply with applicable laws, regulations, policies and plans. Selection of performance standards is governed by the scope of the action to be undertaken and the physical characteristics of the specific site. The standards, which include design features and mitigating measures, must be followed in carrying out an action.

Site-specific planning by interdisciplinary teams will precede most on-the-ground management activities. Interdisciplinary teams are comprised of relevant resource management disciplines. The interdisciplinary team process includes field examination of resources, selection of alternative management actions, analysis of alternatives, and documentation to meet National Environmental Policy Act requirements. Adjacent land uses will be considered during site-specific land management planning.

In addition to being routinely monitored, the Resource Management Plan will be formally evaluated at the end of every third year after implementation begins, until such time as preparation of new plans, that would supersede the Resource Management Plan over a substantial majority of its area, is well under way. The reason for the formal evaluation is to determine whether there is significant cause for an amendment or revision of the plan. Evaluation includes a cumulative analysis of monitoring records, with the broader purpose of determining if the plan's goals and objectives are being or are likely to be met, and whether the goals and objectives were realistic and achievable in the first place.

Evaluation will also assess whether changed circumstances (such as changes in the plans of other government agencies or Indian tribes) or new information so altered the levels or methods of activities or the expected impacts (on water, wildlife, socioeconomic conditions, etc.), that the environmental consequences of the plan may paint a seriously different picture than those anticipated in the Proposed Resource Management Plan/Final Environmental Impact Statement.

As part of these third year evaluations, the probable sale quantity will be reevaluated, to incorporate the results of watershed analyses; monitoring; further inventory; and site-specific, watershed-specific, or province-level decisions.

If an evaluation concludes that the plan's goals are not achievable a plan amendment or revision will be initiated. If the evaluation concludes that land use allocations or management direction need to be modified, a plan amendment or revision may be appropriate. An analysis will address the need for either. If the analysis determines that amending the plan is appropriate, the amendment process set forth in 43 Code of Federal Regulations 1610.5-5 or 1610.5-6 would be followed. If amendment is not appropriate, National Environmental Policy Act procedures would still be followed before the modification is approved, along with coordination through the Regional Ecosystem Office and the Regional Interagency Executive Committee if Supplemental Environmental Impact Statement Record of Decision standards and guidelines or land-use allocations would be modified. Figure 2-3 shows how monitoring and/or evaluation could lead to a revision of management direction or other changes in the Resource Management Plan.

No additional evaluations of this type would be done unless some changed circumstance or unusual event causes the continuing validity of the plan to be questioned. Following completion of each plan evaluation, a summary of its findings will be included in the district's annual program summary.

In future years, after preparation of new plans that would substantially supersede the Resource Management Plan is well under way, if some circumstances change or unusual events occur of a magnitude that question BLM's ability to meet some of the remaining plan objectives, interim management adjustments may be made to meet those objectives, without a plan amendment. The kind of circumstance which could lead to such an adjustment might be an announcement of research findings which clearly establish that some of the plan's goals and objectives are unlikely to be met. The kind of unusual event which could lead to such an adjustment might be a major catastrophe such as a wildfire or windstorm causing extensive damage to forest stands. Similar interim adjustments can be made at any time during the life of the plan, pending evaluation and possible plan amendment.

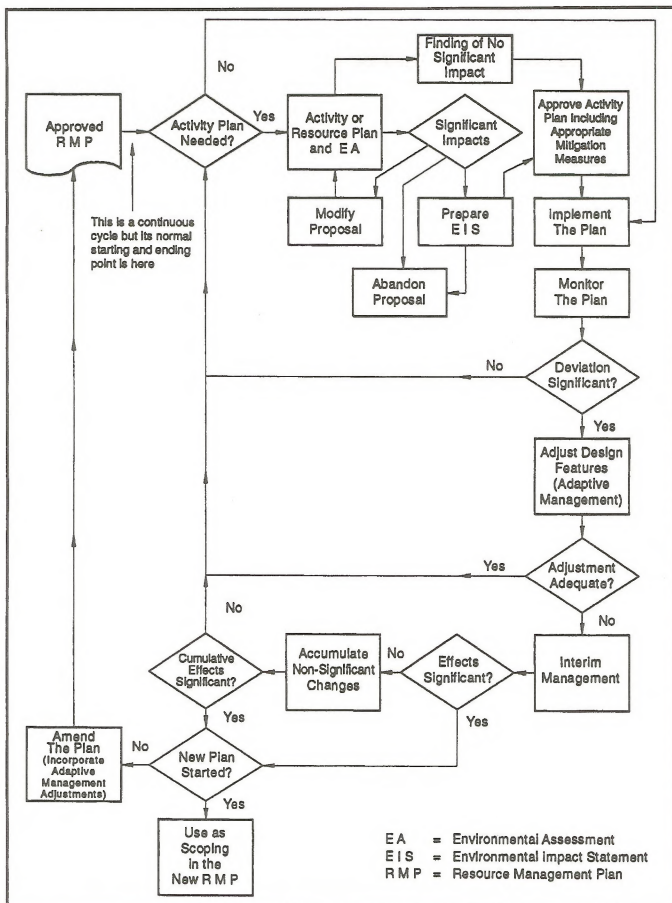
## Adaptive Management

This approach to evaluation and interim adjustment will frame a process of adaptive management, permitting effective response to changing knowledge. Adaptive management is a continuing process of action-based monitoring, researching, evaluating and adjusting with the objective of improving the implementation and achieving the goals of the Resource Management Plan. The Resource Management Plan is based on current scientific knowledge. To be successful, it must have the flexibility to adapt and respond to new information. Under the concept of adaptive management, new information will be evaluated and a decision will be made whether to make adjustments or changes. The adaptive management approach will enable resource managers to determine how well management actions meet their objectives and what steps are needed to modify activities to increase success or improve results.

The adaptive management process will be implemented to maximize the benefits and efficiency of the Resource Management Plan. This may result in the refinement of management direction or land-use allocations which may require amendment of the Resource Management Plan. Adaptive management decisions may vary in scale from Individual watersheds, specific forest types, physiographic provinces, or the entire planning area. Many adaptive management modifications may not require formal changes to the Resource Management Plan.

The model displayed in Figure 2-4 identifies the various steps, activities, and outline of a procedure for the adaptive management process. This diagram conveys the general concept, and is valuable as a starting point, for understanding adaptive management. A full and detailed explanation of the model, which is beyond the scope of this discussion, would require that each step be further broken down and defined.

New information that would compel an adjustment of strategy may come from monitoring, research, statutory or regulatory changes, organizational or process assessments, or any number of additional sources. During the evaluation process, personnel will analyze the information to determine the nature, scope, and importance of the new information.



**Figure 2-3. Process for Changing the Resource Management Plan**

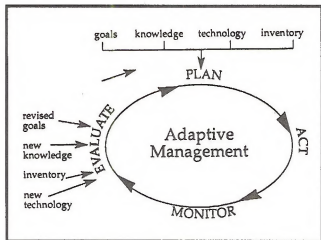


Figure 2-4. Basic adaptive management model

Adaptive management could entail modification of silvicultural prescriptions to respond to increasing knowledge providing greater certainty about anticipated climate change or to respond to increasing knowledge about the habitat needs of spotted owls, to cite two examples that could have widespread application. Adaptive management could equally entail modification of rather localized management practices to respond to the results of monitoring.

Any potential new management actions identified after Resource Management Plan/Record of Decision approval would be reviewed before BLM moves to implement them. For example, if a new area of critical environmental concern proposal meets BLM criteria for consideration, the District Manager may prescribe interim management measures for the remaining life of the plan. Such interim management must meet the objectives of the Resource Management Plan, except where inconsistent with the regulations regarding potential area of critical environmental concerns, and would be subject to analysis in an Environmental Impact Statement or Environmental Assessment linked to a proposed plan amendment or a broader plan revision.

## Watershed Analysis

Watershed analysis is one of the principal analyses that will be used to meet the ecosystem management objectives of this Resource Management Plan. Watershed analyses will be the mechanism to support ecosystem management at approximately the 20 to 200 square mile watershed level. Watershed

analysis, as described here, focuses on its broad role in implementing the ecosystem management objectives prescribed by these standards and guidelines. The use of watershed analysis, as described in the Aquatic Conservation Strategy (see Appendix D), is a more narrow focus and is just one aspect of its role.

Watershed analysis will focus on collecting and compiling information within the watershed that is essential for making sound management decisions. It will be an analytical process, not a decision-making process with a proposed action requiring National Environmental Policy Act documentation. It will serve as the basis for developing project-specific proposals, and determining monitoring and restoration needs for a watershed. Some analysis of issues or resources may be included in broader scale analyses because of their scope. The information from the watershed analyses will contribute to decision making at all levels. Project-specific National Environmental Policy Act planning will use information developed from watershed analysis. For example, if watershed analysis shows that restoring certain resources within a watershed could contribute to achieving landscape or ecosystem management objectives, then subsequent decisions will need to address that information.

The results of watershed analyses may include a description of the resource needs, issues, the range of natural variability, spatially explicit information that will facilitate environmental and cumulative effects analyses to comply with National Environmental Policy Act regulations, and the processes and functions operating within the watershed. Watershed analysis will identify potentially disjunct approaches and conflicting objectives within watersheds. The information from watershed analysis will be used to develop priorities for funding and implementing actions and projects, and will be used to develop monitoring strategies and objectives. The participation in watershed analysis of adjacent landowners, private citizens, interest groups, industry, government agencies, and others will be promoted.

Watershed analysis will be an ongoing, iterative process that will help define important resource and information needs. As watershed analysis is further developed and refined, it will describe the processes and interactions for all applicable resources. It will be an information-gathering and analysis process, but will not be a comprehensive inventory process. It will build on information collected from detailed, site-specific analyses. Information gathering and analysis will be related to management needs, and not be performed for their own sake. While generally watershed analysis will organize, collate, and describe existing information, there may be critical



## Chapter 2 - Description of the Alternatives

information needs that must be met before completing the analysis. In those instances, the additional information will be collected before completing the watershed analysis. In other instances, information needs may be identified that are not required for completing the watershed analysis but should be met for subsequent analyses, planning, or decisions.

Watershed analysis is a technically rigorous procedure with the purpose of developing and documenting a scientifically-based understanding of the ecological structures, functions, processes and interactions occurring within a watershed. The scope of the analysis for implementing the ecosystem management objectives of these standards and guidelines may include all aspects of the ecosystem. Some of these aspects include beneficial uses; vegetative patterns and distribution; flow phenomena such as vegetation corridors, streams, and riparian corridors; wind; fire (wild and prescribed fire, and fire suppression); wildlife migration routes; dispersal habitat; terrestrial vertebrate distribution; locally significant habitats; human use patterns throughout the ecosystem; cumulative effects; and hydrology. The number and detail of these aspects considered will depend on the issues pertaining to a given watershed.

In the initial years of implementation, the process for watershed analysis is expected to evolve to meet long-term objectives. However, some projects proposed for the first few years of implementation are in areas that require watershed analysis prior to approval of the projects (that is, Key Watersheds and Riparian Reserves). In Fiscal Years 1995-96, watershed analysis done for these projects may be less detailed than analyses that are completed in later years. Regardless, analysis done during the initial years (Fiscal Years 1995-96) will comply with the following guidance:

- ◆ The goal of the analysis is to determine whether the proposed actions are consistent with the objectives, land-use allocations and management direction of the Resource Management Plan.
- ◆ Existing information will be used to the greatest extent possible, with new information collected, to the maximum extent practicable, to fill crucial data gaps.
- ◆ Analysis will address the entire watershed, even though some areas may be analyzed at a lower level of precision, and the analysis of issues may be prioritized.

- ◆ Information from the analysis will flow into the National Environmental Policy Act documentation for specific projects, and will be used where practicable to facilitate Endangered Species Act and Clean Water Act compliance.
- ◆ Restoration opportunities will be identified.

A pilot watershed analysis program has been initiated to develop and test an effective long-term process. A scientifically peer-reviewed Watershed Analysis Guide will be finalized based on experiences gained in the pilot program.

The results of watershed analysis will influence final decisions both on timing of land-disturbing activities such as timber sales and on application of design features and mitigating measures, including best management practices for water quality protection. Monitoring and evaluating the effectiveness of best management practices is required by Oregon's Nonpoint Source Management Plan to ensure that water quality standards are achieved and that beneficial uses are maintained. When monitoring identifies previously unanticipated impacts, the information gained from that monitoring will be used in subsequent development of mitigating measures, including best management practices, and considered in future watershed analyses.

Factored into these decisions on land-disturbing activities, where appropriate, would be an assessment of compliance with the anti-degradation policy of Oregon's Water Quality Standards (Oregon Administrative Rules 340-41-026(1)(a)). These standards apply to existing high quality waters which exceed those levels necessary to support recreation and the propagation of fish, shellfish, and wildlife.

Proposed timber sales and other land-disturbing activities will incorporate the interactive (adaptive management) process for developing, implementing and evaluating nonpoint control (best management practices) to determine if water quality goals have been met. Modification of non-point-source controls, including best management practices, will be adjusted based upon sound scientific evidence. Where necessary, appropriate actions to mitigate adverse effects on water quality will be taken to protect designated beneficial uses.

# Requirement for Further Environmental Analysis

Site-specific planning by interdisciplinary teams would precede most on-the-ground management activities. Interdisciplinary teams are comprised of relevant resource management disciplines. The interdisciplinary team process includes field examination of resources, identification of alternative management actions, and analysis. Adjacent land uses would be considered during site-specific land management planning.

Site-specific environmental analysis and documentation (including environmental assessments, categorical exclusions or administrative determinations where appropriate, and resource management plan conformance determination) would be accomplished for each action or type of treatment under consideration. Where the action is to be accomplished by a contractor or timber sale purchaser, the environmental assessment or other environmental analysis is a primary means for determining appropriate contract stipulations. Where the action is to be accomplished by BLM personnel, the environmental analysis is a primary means for determining how it will be conducted. When determining whether activities retard or prevent attainment of Aquatic Conservation Strategy objectives, the scale of analysis typically will be BLM analytical watersheds or similar units.

Watershed analysis or province analysis will often precede environmental analysis of specific proposals, and the findings of such preceding analyses will be addressed in documentation of the environmental analyses. Ultimately, watershed analysis will serve as the basis for developing project-specific proposals and determining monitoring and restoration needs for a watershed. Project-specific National Environmental Policy Act planning will use information developed from watershed analysis. By improving understanding of the ecological structures, functions, processes and interactions occurring within a watershed, watershed analysis will enhance the ability to predict direct, indirect and cumulative impacts of specific proposals in that watershed.

Analyses of proposals for the use of prescribed fire will adhere to the requirements of the Clean Air Act and the State Implementation Plan (including the Visibility Protection Plan and Smoke Management Plan). Conformity determinations, to evaluate whether BLM actions comply with the State Implementation Plan, will be conducted in association with

site-specific environmental analysis, where emissions can be most reasonably forecasted in quantified terms. These analyses will specifically evaluate the effects of project-specific prescribed burning on nonattainment areas.

Accurate assessment of local and airshed-level air quality effects of ecosystem management may require cumulative effects analysis, reflecting all relevant BLM actions, as well as expected actions of other parties. Coordination with other agencies is implicit. Cumulative effects analysis will include consideration of the effects on visibility and regional haze. Where extensive fuel hazard reduction by prescribed burning is considered, the analysis also will consider the impact of prescribed burning on wildfire emissions. This will be done in a quantified tradeoff analysis, comparing emissions from prescribed fire with potential emissions from wildfires if prescribed burning is not accomplished. Factors considered when establishing the geographic boundaries for a cumulative effects analysis include whether the action will result in impacts that cross administrative boundaries, and whether the action will affect sensitive air quality regions (for example, Class I areas and nonattainment areas). Resultant analysis may be based on airsheds.

Interdisciplinary impact analysis will be tiered within the framework of this and other applicable environmental impact statements. Tiering is used to prepare more specific documents without duplicating relevant parts of previously-prepared general documents. The more specific environmental assessment or other environmental analysis cannot lead directly to a change in the decisions based on the more general environmental impact statement to which it is tiered. It could, however, result in some interim management direction pending plan revision, or a proposal to amend the plan. If an environmental assessment indicates potential for significant impacts that are seriously different from those described in an existing environmental impact statement, a new environmental impact statement (or supplement to this or another environmental impact statement) may be required.

Specific proposals for treatment to manage competing vegetation would be addressed in site-specific environmental assessments tiered to BLM's Environmental Impact Statement, *Western Oregon Program-Management of Competing Vegetation*, 1989. Specific proposals for control of noxious weeds would be addressed in site-specific environmental assessments tiered to BLM's Environmental Impact Statement, *Northwest Area Noxious Weed Control Program*, 1985 as supplemented in 1987.



Availability of environmental assessments for public review will be announced in a minimum of one of the following ways:

- ◆ News release distributed to the newsroom of area newspapers, TV, and radio stations;
- ◆ Notices posted in the public area at the Klamath Falls Resource Area office;
- ◆ Mailings to known interested/affected people, groups, tribal units, governmental agencies and businesses. These mailings may include, but are not limited to, District Planning Update progress reports.
- ◆ Legal notices in one or more newspapers circulated in the project area.

## Management of Newly Acquired Lands

Lands may come under BLM administration after completion of the Resource Management Plan/Record of Decision through exchange, donation, purchase, revocation of withdrawals of other Federal agencies, or relinquishment of Recreation and Public Purpose Act leases. Newly acquired or administered lands or interests in lands would be managed for their highest potential or for the purposes for which they are acquired. For example, lands acquired within "special management areas" with Congressional or resource management plan allocation/direction will be managed in conformance with guidelines for those areas. If lands with unique or fragile resource values are acquired, it may be appropriate to protect those values until the next plan revision.

Lands acquired with no identified special values or management goals would be managed in the same manner as surrounding or comparable BLM-administered lands. This implies typical timber harvest opportunities, intensive timber management practices, management of the mineral estate, standard operating procedures and precommitted mitigation measures.

## Costs of Management

The costs of implementing the alternatives would vary, primarily according to the complexity of management proposed the amount of timber that would be offered for sale, and the intensity of management of other resources.

Those alternatives that propose mostly traditional timber management approaches (No Action, A, B, D, and E), even though they allocate widely variable acreage for that purpose, would entail timber management costs essentially proportional to the proposed timber sale volume. These would be consistent with past management costs for this purpose. The alternatives that exclude the most lands from timber harvest would tend to increase costs per unit of timber sold, as necessary road investments and maintenance costs would be prorated against less volume. Countervailing savings may occur, however, as the more restrictive alternatives tend to leave those lands requiring the least costly mitigation available for harvest.

In contrast, the costs of non-traditional forest management as proposed in the Proposed Resource Management Plan and Alternative C would be much higher per unit of timber sold than for the other alternatives. The Proposed Resource Management Plan, with its requirements for watershed analysis, and watershed restoration, entails costs not associated with the other alternatives. Many of these additional costs of the Proposed Resource Management Plan and Alternative C are associated with the ecosystem management approach which focuses on functions of ecosystems. Many of these functions and related forest conditions are not recognized in quantifiable market values and many expected outcomes will not be realized until many years after investments are made.

The annual cost of implementing the Alternative No Action would be similar to the Klamath Falls Resource Area's Fiscal Year 1993 budget, with slight adjustment for inflation, or approximately 3.5 million (this includes 1.3 million for the Wood River Ranch acquisition. Cost estimates for Alternatives A, B, C, D, and E have not been developed. The initial annual cost of implementing the Proposed Resource Management Plan is reflected in the Presidents' Fiscal Year 1995 budget, approximately 2.25 million for the Klamath Falls Resource Area. There is not yet,

however, a clear understanding of what the management needs and costs of the ecosystem management approach will be, so future year budget estimates may differ as experience is gained in implementing the Proposed Resource Management Plan.

## The Budget Link

Timber sale levels and other resource programs will be reduced if annual funding is not sufficient to support the relevant actions assumed in the plan, including mitigation and monitoring. The extent of the reduction will be based on the principle of program balance as envisioned in the plan. For example, if funding in a given year is sufficient only to support half of planned annual investments in pre-commercial thinning, the otherwise anticipated timber sale volume for that year would be reduced by half of the portion of the declared probable sale quantity attributable to pre-commercial thinning. If, in subsequent years, budget levels permit BLM to eliminate the backlog of unfunded investments that have accumulated, timber sale levels will be adjusted upward to the extent that the work can be accomplished. If subsequent budget levels create a cumulative shortfall over the years, the probable sale quantity will be adjusted downward.

This principle will apply similarly to management of roads, facilities, and other resource programs. If maintenance of such facilities is not adequately funded, some of them may be closed to scale back management commitments to the level that is budgeted.

## Monitoring

The BLM planning regulations (43 Code of Federal Regulations 1610.4-9) call for the monitoring and evaluation of resource management plans at appropriate intervals.

Monitoring is an essential component of natural resource management because it provides information on the relative success of management strategies. The implementation of the Resource Management Plan will be monitored to ensure that management actions: follow prescribed management direction (implementation monitoring), meet desired objectives (effectiveness monitoring), and are based on accurate assumptions

(validation monitoring) (see Appendix N). Some effectiveness and most validation monitoring will be accomplished by formal research.

Monitoring will be an integral component of many new management approaches such as adaptive management and ecosystem management.

Adaptive management is based on monitoring that is sufficiently sensitive to detect relevant ecological changes. In addition, the success of adaptive management depends on the accuracy and credibility of information obtained through inventories and monitoring. Close coordination and interaction between monitoring and research are essential for the adaptive management process to succeed. Data obtained through systematic and statistically valid monitoring can be used by scientists to develop research hypotheses related to priority issues. Conversely, the results obtained through research can be used to further refine the protocols and strategies used to monitor and evaluate the effectiveness of Resource Management Plan implementation.

Monitoring results will provide managers with the information to determine whether an objective has been met, and whether to continue or modify the management direction. Findings obtained through monitoring, together with research and other new information, will provide a basis for adaptive management changes to the plan. The processes of monitoring and adaptive management share the goal of improving effectiveness and permitting dynamic response to increased knowledge and a changing landscape. The monitoring program itself will not remain static. The monitoring plan will be periodically evaluated to ascertain that the monitoring questions and standards are still relevant, and will be adjusted as appropriate. Some monitoring items may be discontinued and others may be added as knowledge and issues change with implementation.

Watershed analysis is one of the principal analyses that will be used to meet the ecosystem management objectives. Information from watershed analysis will also be used in developing monitoring strategies and objectives. Specific to monitoring, the results and findings from watershed analysis are used to reveal the most useful indicators for monitoring environmental change, detect magnitude and duration of changes in conditions, formulate and test hypotheses about the causes of the changes, understand these causes and predict impacts, and manage the ecosystem for desired outcomes. Watershed analysis will provide information about patterns and processes within a

## Chapter 2 - Description of the Alternatives

watershed and provide information for monitoring at that scale.

The monitoring process will collect information in the most cost effective manner, and may involve sampling or remote sensing. Monitoring could be so costly as to be prohibitive if it is not carefully and reasonably designed. Therefore, it will not be necessary or desirable to monitor every management action or direction. Unnecessary detail and unacceptable costs will be avoided by focusing on key monitoring questions and proper sampling methods. The level and intensity of monitoring will vary, depending on the sensitivity of the resource or area and the scope of the proposed management activity.

Resource management plan monitoring will be conducted at multiple levels and scales. Monitoring will be conducted in a manner that allows localized information to be compiled and considered in a broader regional context, and thereby address both local and regional issues. At the project level, monitoring will examine how well specific management direction has been applied on the ground and how effectively it produces expected results. Monitoring at broader levels will measure how successfully projects and other activities have achieved the objectives for those management areas.

Monitoring will be coordinated with other appropriate agencies and organizations in order to enhance the efficiency and usefulness of the results across a variety of administrative units and provinces. The approach will build on past and present monitoring work. In addition, specific monitoring protocols, criteria, goals, and reporting formats will be developed, subject to review and guidance of the Regional Ecosystem Office. This guidance will be used to augment and revise the monitoring plan and facilitate the process of aggregating and analyzing information on provincial or regional levels.

Monitoring results will be reported in an "Annual Program Summary" (such as the Lakeview Planning Update), which will be published starting the second year following initial implementation of this resource management plan. The Annual Program Summary will track and assess the progress of plan implementation, state the findings made through monitoring, specifically address the implementation monitoring questions posed in each section of this Monitoring Plan and serve as a report to the public.

The resource area will be responsible for the collection, compilation, and analysis of much of the data

gained through monitoring activities. The resource area will report its findings and recommendations to the District for consolidation and publication in the Annual Program Summary.

The monitoring plan for the Resource management plan is tied to the Monitoring and Evaluation Plan for the Supplemental Environmental Impact Statement Record of Decision. That Monitoring and Evaluation Plan is not yet fully refined. Therefore, this Monitoring Plan is not complete. The BLM has been, and will continue to be, a full participant in the development of the Supplemental Environmental Impact Statement Monitoring and Evaluation Plan. Ongoing BLM effectiveness and validation monitoring will continue where it is relevant to Resource Management Plan direction (for example, stocking surveys, threatened and endangered species studies, and water quality measurements).

The Supplemental Environmental Impact Statement and Resource Management Plan monitoring plans will not identify all the monitoring the Klamath Falls Resource Area will do. More specific activity and project plans may identify monitoring needs of their own.

## Research

A research plan will be developed by the Research and Monitoring Committee identified in the Supplemental Environmental Impact Statement Record of Decision.

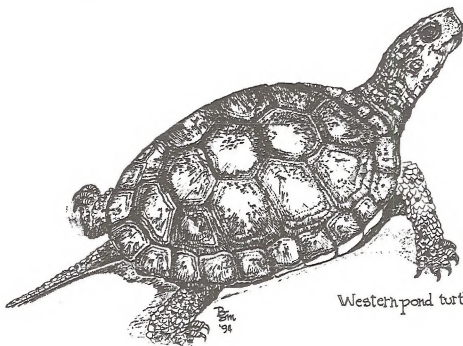
Ongoing research in Riparian Reserves will be analyzed to insure that significant risk to the watershed does not exist. If significant risk is present and cannot be mitigated, study sites will be relocated. Some activities not otherwise consistent with the objectives may be appropriate, particularly if the activities will test critical assumptions of the Forest Plan; will produce results important for establishing or accelerating vegetation and structural characteristics for maintaining or restoring aquatic and riparian ecosystems; or the activities represent continuation of long-term research. These activities will be considered only if there are no equivalent opportunities outside of Riparian Reserves and Key Watersheds.

# Chapter 3

## Affected Environment

### Contents

Major Changes From Chapter 3 of the Draft Resource Management Plan .....	3-3
Climate .....	3-3
Topography and Geology .....	3-3
Lands .....	3-4
Air Resources .....	3-5
Soil Resources .....	3-10
Water Resources .....	3-11
Biological Diversity .....	3-21
Riparian-Wetland Resources .....	3-31
Wildlife .....	3-37
Fish .....	3-41
Special Status and Supplemental Environmental Impact Statement Special Attention Species Habitat .....	3-41
Special Areas .....	3-48
Cultural Resources .....	3-48
Visual Resources .....	3-50
Wild and Scenic Rivers .....	3-50
Wilderness .....	3-52
Recreation .....	3-52
Timber Resources .....	3-58
Ecosystem Health .....	3-63
Energy and Mineral Resources .....	3-67
Socioeconomic Conditions .....	3-68
Rural Interface Areas .....	3-76
Livestock Grazing .....	3-76
Wild Horses .....	3-78
Fire .....	3-79



Western pond turtle





# Major Changes From Chapter 3 of the Draft Resource Management Plan

Several of the discussions, such as biodiversity and water, have been expanded based on public comments. A couple of new discussions, such as fire and special forest/natural products (see the Vegetation Section), have been added, also in response to public comments.

## Introduction

Chapter 3, the affected environment, describes the physical, biological, and socioeconomic characteristics of BLM-administered lands in the Klamath Falls Resource Area as they currently exist. This description serves as a baseline for analyzing and determining the effects on resources (described in Chapter 4) from the various Bureau of Land Management (BLM) management alternatives (described in Chapter 2). Emphasis is placed on those resources that could be affected by the alternatives described in Chapter 2. Unless otherwise indicated, the following discussions refer only to BLM-administered lands in the planning area.

The primary sources of information used in describing the affected environment were the Analysis of the Management Situation and other BLM planning documents. An Analysis of the Management Situation Summary was published in December 1990 and public comments on the Summary were used to update and correct the information for this chapter. The full Analysis of the Management Situation and other resource inventories are available for review at the Klamath Falls Resource Area office. Other cited references are listed in the References Cited section in Chapter 6.

The Bureau's Automated Resource Data and supporting Geographic Information System technology were used to prepare the parts of this chapter relating to lands west of Highway 97, referred to as the Klamath Falls Resource Area's west side (see Map 1-2 in the map packet). Lands east of Highway 97, referred to as the Klamath Falls Resource Area's east side, have not been digitized in the system yet; therefore, resource data for that half of the planning area is manually-generated. Unless otherwise noted in this document, west side acres are computer-derived from the Automated Resource Data/Geographic Information System,

and consequently may not match Master Title Plat acres, which are derived from cadastral survey notes and represent "official" acres. East side acres are derived from Master Title Plats.

The first two sections of this chapter describe the climate, topography, and geology of the planning area, which provides a general setting for the description of the other characteristics of the affected environment.

## Climate

The climate in the Klamath Falls Resource Area is semi-arid, with warm, dry summers and cool, moist winters. Average annual precipitation ranges from 10 to 15 inches in the valleys, 16 to 25 inches in the hills, and 30 to 40 inches in the lower levels of the Cascades on the west side of the planning area. Precipitation is unevenly distributed throughout the year. Forty-four percent of the moisture occurs in winter, 22 percent in spring, 8 percent in summer, and 26 percent in fall. Snowfall accounts for 30 percent of the moisture in the valleys and as much as 50 percent in the mountains.

A wide seasonal variation of temperature occurs in the planning area. Recorded extremes range from -24 to +105 degrees Fahrenheit. Diurnal temperature in January varies approximately 20 degrees; in July, the variance is approximately 40 degrees. Freezing temperatures may occur in every month of the year. The average frost-free season varies from 15 days in summer for the mountains to 126 days near the valley lakes.

In the City of Klamath Falls, the prevailing winds are southerly from November through February, westerly from March through July, and northerly from August through October. Thunderstorms, with an occasional severe hailstorm, can occur throughout the year. Relative humidity in Klamath Falls averages 62 to 74 percent in winter, and 26 to 33 percent in summer.

## Topography and Geology

The topography of the Klamath Falls Resource Area varies from high, steep, rugged mountains formed by volcanic eruptions, to moderate elevation, northwest-southeast trending volcanic uplands separated by lower elevation, alluvium-filled valleys. Elevations generally vary from about 4,100 feet above sea level in the valleys to 7,226 feet above sea level on Yainax Butte.



The Klamath River Canyon is one of the most prominent topographic features in the planning area. The canyon's near-vertical basalt rims rise to 1,000 feet above the river, while the canyon bottom near the Oregon-California border, approximately 2,800 feet above sea level, is the lowest elevation in the planning area.

The Klamath Falls Resource Area lies within two distinct physiographic provinces, the Basin and Range and the High Cascades, which causes it to have wide variations in geology and topography. Over three-fourths of the planning area is within the northwestern corner of the Basin and Range physiographic province. The stratigraphy within this part of the Basin and Range province is characterized by unconsolidated stream- and lake-deposited sediments and complex assemblages of Pliocene- to Pleistocene-age volcanic and sedimentary rocks. These assemblages have been disrupted by post-Pliocene faulting, which has caused the north- to northwest-trending fault block ridges and valleys characteristic of this area. Although internally draining valleys are characteristic of the Basin and Range province, the planning area is drained externally by the Klamath River.

The extreme western portion of the planning area is within the High Cascades physiographic province. This province is characterized by a chain of high elevation active and extinct volcanoes that extend from northern California, through Oregon and Washington, into Canada. The rocks are primarily Pliocene- to Pleistocene-age volcanic flows and pyroclastics. Within the planning area, the High Cascades province consists mainly of Pliocene- to Pleistocene-age basalt and andesite flows that cover Pliocene-age volcanic-derived sandstone, siltstone, diatomite, and tuff. In the southern portion of the planning area Miocene-age andesite flows and tuffs are exposed.

## Lands

Except for one well-blocked parcel, the land on the west side of the planning area lies in a checkerboard pattern, intermingled with privately-owned lands. On the east side, BLM-administered lands range from large well-blocked parcels to isolated, fragmented ones (see Map 1-2 in the map packet). Klamath County contains approximately 4 million acres of which 5.3 percent (212,000 acres) are BLM-administered lands; 44 percent are U.S. Forest Service; 7.7 percent are state, county, and city lands; and 43 percent are private lands. Approximately 52,000 acres (46,000 acres Oregon and California and 6,000 acres public domain) are on the west side and 160,000 acres (all public

domain) are on the east side. The BLM also administers 21,000 acres of reserved mineral estate in the planning area.

Since approval of the current land use plan in 1983, 40 acres of BLM-administered land has been sold, and an additional 70 acres has been transferred out of public ownership in exchange for 160 acres of other land. The Klamath Falls Resource Area acquired 2,240 acres of state-owned land as a result of the statewide exchange between BLM and the State of Oregon. In addition, the Bureau of Reclamation transferred 1,440 acres to the BLM.

Currently, there are five proposed exchange proposals offering approximately 5,500 acres of private land in exchange for 3,400 acres of BLM-administered land. Two BLM sales, which involve 200 acres of public land, are proposed. In addition to those proposals mentioned above, other inquiries and verbal proposals are received regularly.

Withdrawals and classifications are shown in Table 2-13. Withdrawals generally segregate lands from operations under the general land laws and mineral laws but do not affect BLM surface management. Several withdrawals were terminated during a mandated withdrawal review process in 1984, while six withdrawals remain to be reviewed. Classifications generally segregate the lands from all forms of appropriations under the public land laws, including the mining laws but not the mineral leasing laws. All Bureau of Reclamation withdrawals in the planning area have been reviewed. U.S. Forest Service, U.S. Fish and Wildlife Service, and Federal Energy Regulatory Commission administrative withdrawals remain to be reviewed.

Existing right-of-way corridors include Bonneville Power Administration and private utility 500 kilowatt transmission lines. These corridors are shown on Map 2-12 in the map packet. The Western Regional Corridor Study (Clayton and Associates 1986) identified one additional route which parallels the Oregon-California state line, that could affect BLM-administered lands on the east side. The future upgrading of existing electric transmission lines is likely and may require additional right-of-way width.

Additional rights-of-way have been granted for circumstances, such as logging roads, domestic and irrigation water lines, reservoirs, and utility lines for servicing residences. The majority of these are within or adjacent to road clearing limits.

Currently, there are no municipal water storage or intake facilities on BLM-administered land. However, several private and BLM irrigation reservoirs exist on the planning area (see Map 2-12 in the map packet).

The Pacific Gas Transmission company has completed the installation of a 36-inch natural gas pipeline parallel to their existing 36-inch natural gas pipeline. The Northwest Pipeline Company has completed the replacement of the 4-inch natural gas line serving Klamath Falls with a 6-inch diameter pipeline. The Northwest Pipeline Company currently has an application pending with the Federal Energy Regulator Commission and the Bureau of Land Management to construct a 10-inch natural gas pipeline that will provide the Ashland-Medford metropolitan area with natural gas from Northwest Company's pumping plant located near Bonanza, Oregon.

The City of Klamath Falls has filed an application for a right-of-way, concurrently with an application for a license with the Federal Energy Regulator Commission, to construct the 80 megawatt Salt Caves Hydroelectric Project on the Klamath River. The Federal Energy Regulator Commission has released a final Environmental Impact Statement on the project and its alternatives. Refer to that document for a complete description of affected environment, and to Appendix N for a description of the proposed development.

There are no operating pumped storage facilities in Klamath County. According to the waterpower site records maintained by the Oregon BLM State Office, there have been 15 preliminary permit applications made to the Federal Energy Regulatory Commission for pumped storage projects in the Klamath Falls Resource Area since January 1987. Twelve of the 15 are located on Bryant Mountain. All of the applications have been filed by two competing developers at eight different pumped storage site locations, seven of the sites being on Bryant Mountain and the eighth site being on Stukel Mountain. Ten of the 15 preliminary applications, covering six of the locations, are still active. Appendix N provides potential development scenarios for pumped storage hydroelectric projects.

The planning area has seven small-acreage communication sites on hills or ridges. Five sites have public access and four have utility service. Most have several users occupying each site (see Map 2-12 in the map packet).

In support of the timber, recreation, range, and other resource area management programs, 26 miles of road on the west side and 4 miles on the east side of the planning area have been constructed and 560 miles of road on the west side and 480 miles on the east side have been maintained over the past eight years (see Table 3-1 for arterial, collector, and local roads). Easements or reciprocal right-of-way agreements provide physical access to approximately 90 percent of the planning area for timber management. Twenty-four structures or access points have been developed in streams to provide water for the prescribed fire

program, suppression of wildfire, road construction, or road maintenance operations.

As part of the Statehood Act, Oregon was granted, subject to prior valid rights, federal lands (sections 16 and 36) to support a school system. Rights to this land vested with the state upon completion of the land survey. Some of these lands were claimed by others or dedicated to another federal use prior to completion of the survey. The BLM has the responsibility to accommodate the State's 5,202.29 acre in lieu land entitlement with public domain land. The State may select any public domain land administered by BLM in the State of Oregon.

Also granted in the Statehood Act was title to the beds of navigable streams and rivers. Navigability is not always obvious and the State may own or have a valid claim to BLM-administered streams and river bed in the State.

## Air Resources

**The Clean Air Act.** The federal Clean Air Act, as amended in 1990, is designed to reduce air pollution, protect human health, and preserve the Nation's air resources. To protect air quality, the Clean Air Act requires federal agencies to comply with all federal, state, and local air pollution requirements (Section 118).

Several federal air quality programs under the Clean Air Act regulate prescribed burning and other activities. The National Ambient Air Quality Standards are set to protect human health and welfare. Pollutant concentrations that exceed the National Ambient Air Quality Standards endanger public health. Air pollutants for which federal National Ambient Air Quality Standards have been established are called "criteria" air pollutants. They include particulate matter (PM10), sulfur dioxide, nitrogen dioxide, ozone, carbon monoxide, and lead.

**State Implementation Plans.** The Clean Air Act requires each state to develop, adopt, and implement a State Implementation Plan to ensure that the National Ambient Air Quality Standards are attained and maintained for the criteria pollutants. These plans must contain schedules for developing and implementing air quality programs and regulations. State Implementation Plans also contain additional regulations for areas that have violated one or more of the National Ambient Air Quality Standards. These areas are called nonattainment areas. If states fail to submit State Implementation Plans, or fail to adhere to schedules therein, the Environmental Protection Agency has the authority to impose federal sanctions or federal implementation plans.

Table 3-1. Current Inventory of BLM-Controlled Roads.

Surface Type	Functional Classification (miles) <sup>1</sup>			Standard (miles)	
	Arterial	Collector	Local	Single Lane	Double Lane
<b>West Side</b>					
Natural	0.0	1.0	93.0	94.0	0.0
Pit Run	2.0	17.0	63.0	82.0	0.0
Screened Base	0.0	0.0	4.0	4.0	0.0
Aggregate Base	3.5	2.5	11.0	17.0	0.0
Aggregate	8.5	9.51	5.0	33.0	0.0
Bituminous	12.5	6.51	0.0	16.0	13.0
<b>Total</b>	<b>27.0</b>	<b>37.0</b>	<b>176.0</b>	<b>246.0</b>	<b>13.0</b>
<b>East Side</b>					
Natural	10.0	10.0	190.0	200.0	0.0
Pit Run <sup>1</sup>	7.0	26.0	17.0	60.0	0.0
<b>Total</b>	<b>17.0</b>	<b>36.0</b>	<b>207.0</b>	<b>260.0</b>	<b>0.0</b>

<sup>1</sup> The functional classification for roads have been defined by the U.S. Department of Transportation as follows:

**Arterial Roads.** These provide service to large land areas, and usually connect with public highways or other arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource management service. They are usually developed and operated for long-term land and resource management purposes and constant service.

**Collector Roads.** These serve smaller land areas and are usually connected to an arterial or public highway. They collect traffic from local roads or terminal facilities. The location and standard are influenced by long-term multiple use needs, as well as by travel efficiency. Collector roads may be operated for either constant or intermittent service, depending on land use and resource management objectives for the area served by the facility.

**Local Roads.** These roads connect terminal facilities with collector or arterial roads, or public highways. The location and standard are usually determined by the need to serve a specific resource activity or project, rather than travel efficiency. Local roads may be developed and operated for either long- or short-term service.

**Terminal Facility.** Terminal facilities are found on all three road classifications. A terminal facility is usually a site at the end of a road or adjacent to a road, such as landings, viewpoints, wayside stops, parking spurs, or comfort stations. The access to terminal facilities is usually less than 0.1 mile and is considered an integral part of the parent road.

**Prevention of Significant Deterioration and Visibility Programs.** The Clean Air Act established the Prevention of Significant Deterioration program which prevents areas that currently have clean air from being degraded. This program defines three area classifications based on air quality: Class I, Class II, and Class III. Class I areas are subject to the most limiting restrictions regarding how much additional pollution can be added to the air while still protecting air quality. All National Parks and some Wildernesses within the planning area are designated Class I; all lands administered by the Forest Service and Bureau of Land Management within this planning area are Class II. There are no Class III areas within the planning area.

As a national goal, the Clean Air Act also sets the protection of visibility in Class I areas. The visibility protection program provides for remedying existing, and preventing future, impairment to visibility. Map 3-1 in the map packet shows the federal Class I areas and the federal PM10 nonattainment areas within the range of the northern spotted owl.

**Air Quality Related Values.** The Clean Air Act gives federal land managers of Wildernesses (Class I areas) the affirmative responsibility to protect Air Quality Related Values from adverse impacts of air pollution (Section 165(d)). These are values within Class I areas, such as visibility, biological diversity, and water quality, that are necessary to protect.

**Air Quality Programs and Prescribed Fire.** State and local governments have the authority to adopt their own air quality rules and regulations. These rules can be incorporated into the State Implementation Plan if they are equal to, or more protective than, federal requirements. For example, some states have incorporated smoke management provisions for prescribed burning into their plans.

The State of Oregon Department of Environmental Quality has a State Implementation Plan that has been approved by the Environmental Protection Agency. This State Implementation Plan addresses the criteria pollutants emitted from prescribed burning (PM10), visibility, and smoke management.

**Conformity.** The conformity provisions of the Clean Air Act (Section 176(c)), prohibit federal agencies from taking any action that causes or contributes to a new violation of the National Ambient Air Quality Standards, increases the frequency or severity of an existing violation, or delays the timely attainment of a standard. Section 176(c) specifically states that federal agencies must ensure that their actions conform to the applicable State Implementation Plan. The Environmental

Protection Agency is required to promulgate criteria and procedures for demonstrating and ensuring conformity of federal actions to a State Implementation Plan. The Environmental Protection Agency finalized these regulations on November 30, 1993 (58 Federal Register 63214). Because prescribed fire emissions affect air quality, conformity determinations must be made at subsequent planning levels, such as watershed and landscape-level analyses, and project/site-specific analyses.

**Health and Welfare Effects of Prescribed Burning Pollutants.** Criteria pollutants emitted from or formed as a result of prescribed fire include particulate matter (PM10), oxides of sulfur and nitrogen, carbon monoxide, and ozone. Health effects associated with exposure to criteria pollutant levels greater than the National Ambient Air Quality Standards vary, and include lung damage, the reduction of the blood's ability to carry oxygen, eye irritation, chest pain, nausea, and an increased respiration rate. In terms of effects other than on human health (termed welfare effects), recent studies indicate that some aspects of forest health are adversely affected by several criteria pollutants produced by fire. Additional research is necessary to determine the human health and welfare effects specific to prescribed fire emissions.

Many other noncriteria, but potentially toxic, pollutants are emitted by prescribed fire, including polynuclear aromatic hydrocarbons and aldehydes. Effects vary from exposure to these pollutants emitted during combustion. Some polynuclear aromatic hydrocarbons are known or potential carcinogens; other components, such as aldehydes, are acute irritants. Many of these air toxics dissipate or bind with other chemicals soon after release, making it difficult to estimate human exposure and consequential health effects. Additionally, the health and welfare effects of air toxics released by prescribed burning or wildfires have not been directly studied.

**Focus on Particulate Matter Smaller Than 10 Micrometers.** A term used to describe airborne solid and liquid particles 10 micrometers or smaller in size is PM10. Because of its small size, PM10 readily lodges in the lungs, thus increasing levels of respiratory infections, cardiac disease, bronchitis, asthma, pneumonia, and emphysema. The Environmental Protection Agency is considering more stringent National Ambient Air Quality Standards for PM10 because recent studies indicate that the current National Ambient Air Quality Standards may not be adequate to protect individuals with a greater sensitivity to these particulates. Typical sources of PM10 include industrial processes, woodstoves, roads, agricultural practices, and prescribed fires and wildfires.



### Chapter 3 - Affected Environment

The air quality analysis in this Environmental Impact Statement focuses primarily on the impacts of particulate matter from prescribed burning. Particulate matter (PM10) is of the most interest because of the large quantities emitted from fires, the potential contribution of PM10 from prescribed and wildfires to pollutant concentrations above the PM10 standard, the major reduction of visibility caused by PM10, and the role PM10 plays as a carrier of other toxic pollutants.

**Meteorological Factors.** Weather patterns strongly influence air quality and smoke management by controlling the dispersion of emissions from fires. The primary weather conditions that affect dispersion are atmospheric stability, mixing height, and transport wind speed. Atmospheric stability refers to the tendency for air to mix vertically through the atmosphere. Mixing height is the vertical distance through which air is able to mix. Transport wind speed is a measure of the ability of air to carry emissions away from a source horizontally. These three factors determine the ability of the atmosphere to disperse and dilute emissions that are released from prescribed fires and wildfires.

The physiography, or physical shape, of landscapes interacts with and controls some weather patterns that influence emission dispersion. Many of the interior basins of the Pacific Northwest (for example, the Willamette Trough and many southwest Oregon river valleys) can trap emissions during periods when the atmosphere is relatively stable and winds are light. The mixing height is shallow, and pollutants may accumulate near the ground in these basins. This atmospheric condition is most likely to occur at times from November to March. However, little underburning or broadcast burning occurs at this time of year. In other physiographic provinces, and during the remainder of the year, prescribed burning is conducted when transport winds are not expected to carry emissions to smoke-sensitive areas in quantities that affect Prevention of Significant Deterioration increments and visibility. Furthermore, prescribed burning activities are coordinated with state and local air quality agencies to ensure that atmospheric stability and mixing heights are advantageous for dispersion.

**Recent Prescribed Fire Use and Emissions.** Prescribed fire use during the recent past was analyzed to assess the effect on air quality of implementing the alternatives in this Environmental Impact Statement. The years 1985 through 1992 were analyzed because prescribed fire use trends for this period were representative of recent forest management practices, and because data quality was reasonably good. Detailed reporting of prescribed fire statistics is required in the Oregon Smoke Management Plan.

Prescribed burning during the mid-to-late 1980's reflects a large amount of burning to dispose of harvest residues (usually called slash burning) and to reduce moisture stress and growing-space competition from other onsite vegetation. Slash burning was used to reduce wildfire hazard and to prepare harvested sites for planting. Less than 10 percent of the burning that occurred from 1980 to 1988 was for ecosystem management purposes (see Table 3-2). From 1990 to 1992, PM10 emissions from prescribed burning declined rather sharply. During that period, the acreage requiring prescribed fire for slash burning and site preparation was reduced due to decreased timber harvesting. Emissions also decreased with the use of emission reduction techniques.

**Prescribed Burning Air Quality Impacts.** The air quality impact of prescribed burning during the 1985 to 1992 time period is difficult to quantify. While burning forest residues can create large quantities of particulate matter and other pollutants, this burning usually takes place in relatively remote areas with intensities that vent smoke high into the atmosphere where it is widely dispersed.

As one indicator of smoke impacts, Oregon Department of Forestry tracks smoke intrusions into designated areas (primarily population centers). An intrusion is defined as smoke from prescribed burning entering a designated area at ground level. Intrusions do not necessarily violate air quality standards, although they may cause public nuisances. The 1992 Oregon Smoke Management Annual Report displays the trend in intrusions over the 1985 to 1992 period. The area burned and the number of intrusions per year have both declined sharply in the early 1990's. However, because only smoke intrusions into designated areas are reported, potential impacts in very small towns or rural areas close to forest lands may be overlooked. Increased use of fire for ecosystem management may increase the number of intrusions per year. In particular, intrusions may increase because it is difficult to vent smoke from underburning into the upper atmosphere because of the low-intensity burning required to protect the residual stand.

The 1991 and 1992 Oregon Smoke Management Annual Reports also report PM10 violations. The Oregon Department of Forestry analyzed burning and weather conditions for the dates of violations and concluded that forestry-related burning did not contribute to any violation in either year.

Prescribed burning can adversely impact visibility in Class I areas where excellent air quality is an important value. Special remote-area monitoring in Oregon

**Table 3-2. Past Consumption and Pollutant Emissions in the Klamath Falls Resource Area (Expressed in Tons).**

Type of Treatment	BLM Acres Burned	Consumption Rate (Tons/Acre)	Tons Consumed	TSP <sup>1</sup>	PM-10 <sup>2/3/4</sup>	Organic Compounds <sup>5/6</sup>	Carbon Monoxide <sup>7/</sup>	Sulfur Oxides <sup>8/9</sup>	Nitrous Oxides <sup>6/9</sup>	Total Emissions <sup>10</sup>
<b>ANNUAL AVERAGE FOR 1989 TO 1992</b>										
Broadcast	7	60	420	6	4	5	42	1	1	55
Piles	432	30 <sup>11</sup>	12,960	133	81	162	991	26	26	1,338
Underburn	1,177	33 <sup>12</sup>	38,841	563 <sup>3</sup>	399	486	3,913	78	78	5,118
Total	1,616	128	52,221	702	484	653	4,946	105	105	6,511
<b>EXPECTED UNDER THE PROPOSED RESOURCE MANAGEMENT PLAN</b>										
Underburn	3,000	40 <sup>12</sup>	120,000	1,740 <sup>3</sup>	1,232	1,500	12,090	240	240	15,810

<sup>1</sup> Average emission of total suspended particulates is 29 pounds per ton fuel burned for broadcast burn and 20.5 pounds per ton fuel burned for piles.

<sup>2</sup> Average emission of particulate matter with a nominal size of 10 microns or less (PM-10) is 20.53 pounds per ton fuel burned for broadcast burn and 12.5 pounds/ton fuel burned for piles.

<sup>3</sup> Assumes that broadcast and underburns have the same emission rate.

<sup>4</sup> PM-10 is part of total suspended particulates and is not included in totals.

<sup>5</sup> Volatile organic compounds are a diverse class of compounds containing hydrogen, carbon, and oxygen. Average emission is 25 pounds/ton fuel burned.

<sup>6</sup> Assumes that broadcast, piles, and underburns have the same emission rates.

<sup>7</sup> Carbon monoxide average emission is 201.5 pounds per ton for broadcast and underburns; 153 pounds per ton for piles.

<sup>8</sup> Sulfur oxides, which include sulfur dioxide, are produced in small quantities and have average emissions of 4 pounds per ton fuel burned.

<sup>9</sup> Nitrous oxides, which include nitrogen dioxide, have average emissions of 4 pounds per ton fuel burned.

<sup>10</sup> Average emissions of carbon dioxide and water vapor are greater than 90 percent of all emissions. Carbon dioxide emissions average 1.58 tons/ton of fuel for broadcast and underburns. Emissions of carbon dioxide average 1.64 tons per ton for pile burns.

<sup>11</sup> Estimated weight of piles on a per acre basis for the 1991-1993 fuel surveys.

<sup>12</sup> Based on consumption rate during spring 1989 to 1992 underburns.



### Chapter 3 - Affected Environment

during 1982 to 1984 showed that prescribed burning contributed 48 percent of the particulate pollution at one Class I monitoring site and 41 percent at another, demonstrating that impacts can be significant. Prescribed fire use under any of the alternatives should follow state visibility requirements to minimize impacts. Whether prescribed natural fire from unplanned ignitions should be restricted for visibility protection is still under discussion by air quality agencies.

## Soil Resources

Most renewable resources of the Klamath Falls Resource Area depend upon soil. The combined influences of time, parent material, climate, vegetation, and topography of a site interact to form a soil with a unique set of characteristics. These characteristics determine the productivity capacity of a soil and can influence its management requirements. Soils store and deliver water to streams and lakes as well as provide a medium for plant growth. Soil productivity is a measure of a soil's ability to produce vegetation. It must provide adequate moisture, aeration, nutrients, and anchorage for vegetation to grow. A number of soil properties (such as organic matter content, nutrients, texture, structure, porosity, and depth) are important for vegetative growth. Soil disturbance can be a consequence of most management activities. Management activities can cause soil displacement, compaction, erosion, and organic matter removal. Timber and range management practices are the main management activities that affect soil productivity.

The Soil Conservation Service has delineated geographic areas that have a distinctive pattern of soils, topography, and drainage. These areas are referred to as soil associations. Each soil association consists of one or more major soils and some minor soils. Fourteen soil associations occur in the Klamath Falls Resource Area. Additional soils information (such as distribution, profile descriptions, texture classification, permeability, available water capacity, and pH), collected by the Soil Conservation Service and BLM soil scientists, is available at the resource area office. The Soil Conservation Service has also provided interpretations by soil series for most soils occurring in the Klamath Falls Resource Area in their Soil Survey of Klamath County, Oregon, Southern Part (Soil Conservation Service 1985).

An intensive inventory known as the Timber Productivity Capability Classification system has been completed for the resource area. It provides site-specific information concerning BLM-administered lands (see Timber Resources section). This information identifies fragile sites where the timber growing potential could be reduced by management activities due to inherent soil properties and landform characteristics. Detailed

information and classification descriptions are contained in the Klamath Falls Resource Area Timber Productivity Capability Classification Handbook and Oregon Handbook 5251.

Table 3-3 displays the acres of fragile non-suitable woodland sites. These sites are judged to be biologically and/or environmentally incapable of supporting a sustained yield of timber. They are removed from the commercial forest land base and managed for their non-timber resources. Table 3-4 displays the acreage of fragile suitable restricted woodland which has been identified to be fully capable of being managed for timber production without site deterioration or off site impacts when best management practices are used to avoid and mitigate potential impacts from management activities.

The Klamath Falls Resource Area Monitoring Plan and the Oregon BLM Manual Supplement H-1734 (1988b), Monitoring Western Oregon Records of Decision, provide guidance for collecting data and/or analyzing management actions in timber management plans as directed by the records of decision. Standards, as described in the resource area monitoring plan, for bare soil exposed by prescribed fire, surface erosion, mass wasting, and compaction have been established. Monitoring of the west side was initiated in 1988. Range monitoring standards are outlined in the Klamath Falls Resource Area Monitoring Plan and the Oregon BLM Manual Supplement H-1734-2, Rangeland Monitoring Handbook. The resource area plan requires monitoring of the most sensitive sites where range management activities have occurred. A Soil Productivity Monitoring Plan is discussed in Appendix O. Information on watershed condition is located in the Water Resources section.

**Table 3-3. Fragile Nonsuitable Woodland.<sup>1</sup>**

Classification of Woodland	Acres	Percent of Total BLM Land Base
Soil Moisture	0	
Nutrient	0	
Slope Gradient	47	<1%
Mass Movement Potential	0	
Surface Erosion Potential	0	
Groundwater	323	<1%

<sup>1</sup> These are lands where the timber growing potential will be reduced due to the soils having critical moisture supplying capacities, severe nutrient problems, critical slope gradients, mass movement (landslide) potential, severe surface erosion potential, or high groundwater levels. See the "Timber Productivity Capability Classification" BLM Manual Supplement, Oregon State Office, Handbook 5251-1 for a more detailed description.

**Table 3-4. Fragile Suitable, Restricted.<sup>1</sup>**

Classification of Woodland	Acres	Percent of Total BLM Land Base
Soil Moisture	0	
Nutrient	0	
Slope Gradient	0	<1%
Mass Movement Potential	92	
Surface Erosion Potential	0	
Groundwater	21	<1%

<sup>1</sup> These are lands where the timber growing potential may be reduced due to the soils having critical moisture surface erosion potential, or high ground-water levels. See the "Timber Productivity Capability Classification Classification" BLM Manual Supplement, Oregon State Office, Handbook 5251-1 for a more detailed description.

## Water Resources

The planning area is located entirely within the Klamath Basin. Water on the west side of the planning area drains into the upper Klamath River. On the east side, water drains into the Lost River drainage (a part of upper Klamath River system) where it is used for irrigation, and then a portion of the water is returned to the upper Klamath River. The annual water yield from the upper Klamath River below the John C. Boyle Powerhouse is 6.48 inches per square mile (U.S. Geological Service 1984, 1989). At the J.C. Boyle Powerhouse, where the calculation is made, the Basin is 4,080 square miles. The total area of the Basin, to the Pacific Ocean, is approximately 16,500 square miles.

The State of Oregon has established beneficial uses for the Klamath Basin and water quality requirements that provide protection for those uses. Sediment, stream temperature, dissolved oxygen, and chemical composition are important indicators of the level of protection for beneficial uses within a watershed. These indicators are listed in the Oregon Administrative Rules (340-41) and are summarized in Table 3-5. The primary beneficial uses for water resources that are related to land management activities on Bureau of Land Management (BLM)-administered lands are rearing and spawning habitat for salmonids, domestic water supply, fishing, resident fish and aquatic life, and recreation (see Table 3-6). All these uses require high water quality and sufficient water quantity. The Klamath River Basin Compact (Oregon Revised Statutes 542.610 to 542.630), an interstate compact between Oregon and California, identifies beneficial uses for the waters of the Basin, including domestic, irrigation, recreation, fish

and wildlife, industrial, and hydroelectric power purposes, along with other uses recognized by each state involved.

The United States Environmental Protection Agency has delegated authority to implement the Federal Water Pollution Control Act and amendments (such as the Clean Water Act) in Oregon to the Department of Environmental Quality. A Memorandum of Agreement (1990) between the Department of Environmental Quality and the BLM identifies statewide nonpoint source (see Glossary) program objectives, priority waterbodies with nonpoint source project descriptions, and nonpoint source control projects. The Department of Environmental Quality is developing priorities for protection and improvement of waterbodies in Oregon. Attention is focused on waterbodies with the greatest need for assistance in recovery from nonpoint source pollution.

The BLM is a Department of Environmental Quality Designated Management Agency charged with implementing and enforcing natural resource management programs for the protection of water quality on federal lands under its jurisdiction. Nonpoint source water quality problems are best controlled through the development, adoption, and implementation of resource management practices referred to as best management practices. The Oregon Forest Practices Act is the basic framework for best management practices for forestry-related activity. The BLM's best management practices meet the substantive requirements of these State Practices. The Department of Environmental Quality assists the BLM in developing or updating best management practices, establishing new best management practices, and evaluating whether practices that protect rivers and lakes also protect wetlands and groundwater supplies thru a Memorandum of Agreement between the BLM and the Department of Environmental Quality (BLM 1990).

**Table 3-5. Oregon's Instream Water Quality Standards.<sup>1</sup>**

Parameter with Numeric Standards <sup>2</sup>	Primary Beneficial Uses Protected <sup>3</sup>
Dissolved Oxygen	Fisheries and Aquatic Life
Enterococcus Bacteria	Water-Contact Recreation
pH	Fisheries and Aquatic Life
Temperature	Fisheries and Aquatic Life
Turbidity	Fisheries and Aquatic Life
Chlorophyll <i>a</i>	Aesthetics, Fisheries & Aquatic Life

<sup>1</sup> Includes the Primary Beneficial Uses which They Protect [from Department of Environmental Quality's 305(b) Report, 1992].

<sup>2</sup> Numeric standards are listed for the Klamath Basin in OAR 340-41-965.

<sup>3</sup> Additional beneficial uses protected by these standards include aesthetics, livestock watering, wildlife, and irrigation water supply.

**Table 3-6. Beneficial Uses of Waters in the Klamath Basin as Listed in DEQ's Basin Rules.**

Beneficial Uses	All BLM-Managed Waters
Public Domestic Water Supply <sup>1</sup>	X
Private Domestic Water Supply <sup>1</sup>	X
Industrial Water Supply	X
Irrigation	X
Livestock Watering	X
Salmonid Fish Rearing <sup>2</sup>	X
Salmonid Fish Spawning <sup>2</sup>	X
Resident Fish and Aquatic Life	X
Wildlife and Hunting	X
Fishing	X
Boating	X
Water Contact Recreation	X
Aesthetic Quality	X
Hydroelectric Power	
Commercial Navigation and Transportation	

<sup>1</sup> With adequate pre-treatment and natural quality to meet drinking water standards.

<sup>2</sup> Where natural conditions are suitable for salmonid fish use.

Source: Oregon Administrative Rules 340-41-962

Recently, Oregon adopted an antidegradation standard (Oregon Administrative Rules 340-41-026) that incorporates required federal policies. This standard requires that water quality in high quality waterbodies be maintained above standards unless no other reasonable alternatives exist and the polluting activity is necessary and justifiable for economic or social benefit. However, even if these two criteria are satisfied and some water quality degradation is allowed, the antidegradation standard requires that water quality standards continue to be met and beneficial uses protected. High quality waters are those waters which meet or exceed those levels necessary to support the propagation of fish, shellfish, and wildlife and recreation in and on the water, and other designated beneficial uses (Oregon Administrative Rules 340-41-006 [41]). The antidegradation standard also prohibits degradation of water quality in outstanding resource waters and waters failing to meet water quality standards. No waterbodies on BLM-administered lands in the Klamath Falls Resource Area

have been nominated as outstanding resource waters. (Department of Environmental Quality 1992).

The purpose of the federal antidegradation policy and State standards is to meet the goals of the Clean Water Act and to restore and maintain the chemical, physical, and biological integrity of waters in the State. To further progress towards this goal, in July 1991 Oregon adopted narrative biological criteria (biocriteria) as part of its Water Quality Standards (Oregon Administrative Rules 340-41-027). This standard requires that water quality be sufficient to support aquatic species without detrimental changes in the resident biological communities. The state is in the process of developing the implementation guidance for the biocriteria and is selecting appropriate reference sites in various ecological regions in the state. In addition, the State expects to adopt numeric biocriteria in three to five years (U.S. Environmental Protection Agency 1992). The Klamath Falls Resource Area currently shares the results of its macro-invertebrate (see Glossary) sampling program with the Department of Environmental Quality.

Sections 401, 402, and 404 of the Clean Water Act require that project work (particularly dredge or fill activities) potentially affecting waters of the state, including wetlands, obtain permits from the Department of Environmental Quality (through the Oregon Division of State Lands) and the U.S. Corps of Engineers. The BLM cooperates with these agencies when proposing land management activities that could potentially affect these areas.

Table 3-7 lists the major water impoundments located on BLM-administered lands.

No community or municipal system watersheds are located on Klamath Falls Resource Area lands except for the Fall Creek watershed that serves the city of Yreka, California. Sixteen percent of this watershed is managed by the BLM, the majority of which is administered by the Medford District. The Fall Creek watershed is discussed in the Medford District Resource Management Plan/Environmental Impact Statement.

## Watershed Conditions

### Analytical Watersheds

Lands administered by the BLM have been delineated into analytical watersheds using logical boundaries, topography, and basin size (see Appendix F). This was done to display existing watershed conditions and to assess impacts of the alternatives on water resources.

Table 3-7. Water Impoundments on BLM-Administered Lands.

Basin Name	Name	Size (Ac. ft.)	Use
KLAMATH RIVER	Gerber Reservoir	94,300	R,I,F
	Willow Valley Reservoir	10,800	R,I,F
	Round Valley Reservoir <sup>1</sup>	1,380	R,I,F
	Kilgore Reservoir	2,206	R,I,F
	Bumphead Reservoir	1,450	R,I,F
	Antelope Reservoir	800	R,I,F
	Big Adobe Reservoir <sup>1</sup>	543	R,I,F
	Dog Hollow Reservoir <sup>1</sup>	444	R,I,F
	Upper Midway Reservoir <sup>1</sup>	286	R,I,F
	Copeland Reservoir	80	R,I,F
	Dean Detention Dam	60	R,I,F
	Co-op Detention Dam	48	R,I,F
	Twenty-one Dam <sup>1</sup>	1	R,I,F
	Gerber Lake Detention Dam <sup>1</sup>	5	R,I,F
	Midway Reservoir <sup>1</sup>	2	R,I,F

<sup>1</sup> The BLM holds the water rights to these impoundments.

**Abbreviations used:**

Ac. ft. = acre feet

R = Recreation

I = Irrigation

F = Flood control

Three subwatersheds on the west side that are representative of the entire Klamath-Spencer watershed, as well as one watershed on the east side, were chosen for impact analysis (see Table 3-8 and Map 3-2 in the map packet). The Barnes Valley watershed was the only watershed analyzed on the east side because it is the only watershed containing a relatively large component of commercial forest land and is expected to receive silvicultural treatment, including harvest, within the life of the plan.

The Klamath-Spencer watershed is not analyzed in Chapter 4 because of its minimal BLM ownership (15 percent). However, three subwatersheds that are representative of the Klamath-Spencer watershed, all with more than 25 percent BLM ownership, will be used for impact analysis in Chapter 4.

A portion of the planning area on the west side is located in the Jenny Creek analytical watershed. Conditions in the Jenny Creek analytical watershed, which contains the Sheep Creek and Johnson-Cold

Creek subwatersheds, are discussed in the Medford District Proposed Resource Management Plan/Environmental Impact Statement. The Jenny Creek analytical watershed is 133,850 acres, of which 42,480 acres (32 percent) are administered by Medford BLM and 11,990 acres (9 percent) by the Klamath Falls Resource Area (Lakeview District) BLM. A small portion of the planning area is located in the Fall Creek subwatershed (6,740 acres), of which less than 1 percent (50 acres) is administered by the Klamath Falls Resource Area.

Watershed condition on the east side has not been surveyed recently. Information on watershed characteristics for this area was gathered in the Phase 1 watershed inventory conducted in 1971, with the results analyzed in 1976. The Phase 1 watershed inventory was an extensive survey of watershed condition supported by field transects. It was part of the Watershed Conservation and Development System, which the BLM no longer uses. The purpose of the inventory was to rank watershed areas against common criteria to establish priority areas for intensive analysis.

Table 3-8. Analytical Watersheds.

Name	Analytical Watershed Acres	Percent Watershed In BLM Management	Stream Order	Miles of Stream <sup>1</sup>	Miles of Stream on BLM Lands <sup>1</sup>
Klamath-Spencer	151,290	15	1&2	423	104
			3	59	15
			4	36	7
			5	12	1
			6+	16	8
Middle Spencer	9,740	42	1&2	28	13
			3	3	2
			4	1	1
			5	6	2
			6+	0	0
South Hayden	6,860	46	1&2	22	10
			3	3	1
			4	4	2
			5	5	2
			6+	0	0
Lower Buck Lake	9,560	37	1&2	21	7
			3	2	1
			4	4	1
			5	0	0
			6+	0	0
Barnes Valley	21,360	45	1&2	33	9
			3	9	7
			4	2	2
			5	0	0
			6+	0	0

<sup>1</sup> Rounded to the nearest mile.



In the Phase 1 inventory, the soil surface factor method (used to assess erosion conditions in a watershed) evaluated soil movement, surface cover, surface erosion, vegetation type, and soil type to determine erosion conditions within a watershed. Results were then divided into erosion condition classes based on severity (see Map 3-3 in the map packet). The interpretive value of the Phase I and soil surface factor data is limited to determining watershed condition trends.

Watersheds in the planning area are generally in stable and fair to good condition. Some streams on BLM-administered lands have experienced downcutting and erosion due to past overgrazing. See the Riparian and Wetland Resources section for a listing of nonfunctioning riparian/stream systems that have been identified as potential sites for restoration activities.

## Key Watersheds

Key Watersheds are a system of large refugia comprising watersheds that are crucial to at-risk fish species and stocks and provide high quality water. Refugia are designated areas that either provide, or are expected to provide, high quality habitat. A system of Key watersheds that serve as refugia was established by the Supplemental Environmental Impact Statement Record of Decision to maintain and recover habitat for at risk stocks of anadromous salmonids and resident fish species. These refugia include areas of high quality habitat as well as areas of degraded habitat.

The Record of Decision includes two designations for Key Watersheds. Tier 1 (Aquatic Conservation Emphasis) Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program. Tier 2 watersheds may not contain at-risk fish stocks, but they can be important sources of high quality water.

There are three Key Watersheds in the resource area:

- ◆ Spencer Creek (Tier 1 - 40,855 acres, 18 percent BLM);
- ◆ Clover Creek (Tier 2 - 13, 955 acres, 8 percent BLM); and
- ◆ Jenny Creek (Tier 1 - 132,992 acres, 9 percent Klamath Falls BLM, 32 percent Medford District BLM).

Clover Creek is a tributary to Spencer Creek.

The Lower Buck Lake and Middle Spencer Creek analytical watersheds and a portion of the Klamath-Spencer analytical watershed are contained within the Spencer Creek Key Watershed. The South Hayden and Barnes Valley analytical watersheds are located outside of any Key Watersheds.

## Watershed Analysis

The President has directed federal agencies to work together toward implementing the concepts of ecosystem-based management. The concepts and management direction presented in the Record of Decision confirm that a landscape-level analysis of the various components and interrelationships in the ecosystem will be the tool for development of future land management programs and projects. The Record of Decision refers to this landscape-level analysis as a "watershed analysis", and this analysis is conducted at approximately the 20 to 200 square mile watershed level.

The results of watershed analysis may include a description of the resource needs, issues, the range of natural variability, spatially explicit information that will facilitate environmental and cumulative effects analyses to comply with Environmental Protection Agency regulations, and the processes and functions operating within the watershed. The information from watershed analysis will be used to develop priorities for funding and implementing actions and projects, and will be used to develop monitoring strategies and objectives. The participation in watershed analysis of adjacent landowners, private citizens, interest groups, industry, government agencies, Indian tribes, and others will be promoted.

Watershed Analysis will be the primary mechanism for obtaining and updating information about current watershed conditions within the resource area. A watershed analysis has begun for the Spencer Creek and Clover Creek Key Watersheds. This analysis is being conducted in partnership with the Winema National Forest, among others.

A coordinated resource management plan for the Spencer Creek Watershed was recently completed. The plan addresses the rehabilitation of the stream's riparian-wetland areas and monitoring of the stream's temperatures and water quality.



## Groundwater

The geologic formations influencing groundwater hydrology in the Klamath Basin include alluvial materials and the volcanic rocks of the Western Cascades, High Cascades, and Basin and Range physiographic provinces. The volcanic rocks of the High Cascades province serve as a large catchment area, or aquifer, for rain and snowmelt (City of Klamath Falls 1986). The Klamath River drains much of south-central Oregon and serves as a point of local, intermediate, and possibly regional groundwater discharge. Groundwater is mostly under unconfined conditions. Porosity and permeability vary greatly, allowing locally-perched groundwater to occur.

Groundwater is used for irrigation, domestic use, and livestock use. Water yields can vary greatly within short distances due to variations in the water-bearing character of the volcanic rocks that form the aquifer. Groundwater supplies in the Klamath Basin may be adequate to meet needs in the future, due to recharge of the volcanic aquifer. There is a lack of baseline information to assess the current status of groundwater quality or quantity. The U.S. Environmental Protection Agency has not identified any sole-source aquifers in the planning area. Groundwater quality is good in the basin, with the exception of a few localized problems with mineralized water, arsenic, and pollution of shallow aquifers. The results of recent groundwater quality studies in the Klamath Basin are summarized in the Department of Environmental Quality 1992 305(b) Report.

Water wells on BLM-administered land exist at Topsy Campground, North Campground, Gerber recreation site, Gerber Guard Station, Ben Hall Well, and the former Keno Air Force Station on Hamaker Mountain. These wells are monitored to ensure that the State of Oregon's requirements for public water systems are met (Oregon Administrative Rules 333).

## Surface Water Quality

In 1988 the Oregon Department of Environmental Quality conducted an extensive inventory of water quality problems in the state, *The 1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution*.

Waterbodies intersecting BLM-administered lands where serious nonpoint source pollution problems are known to exist, or have been reported without challenge, based on information in the Department of Environmental Quality assessment report, are listed in

Table 3-9. Pollution types are classified according to source of information (substantiated with data or reported observations) and pollution problems are rated as being severe or moderate. Additional information on the status of water quality in the Klamath Basin and on Department of Environmental Quality's water quality programs is contained in the Oregon Department of Environmental Quality's Water Quality Status Assessment [305(b)] Report (1992).

**Klamath River.** The upper Klamath River has on occasion not met water quality requirements due to the following: high water temperature; low dissolved oxygen; high turbidity; high pH; and high levels of algae, bacteria, and suspended sediment (Department of Environmental Quality 1988). These water quality problems in the upper Klamath River result from both natural and human-caused conditions, and are worse in late summer and fall when basin inflows are low and agricultural diversions and returns are high. Some of the reduction in water quality is due to poor quality of irrigation return water from the Lost River Basin (Department of Environmental Quality 1976). High summer water temperatures in the upper Klamath River are natural due to extensive marshes and the shallow waters of Upper Klamath Lake. Reservoirs created by dam construction, along with irrigation returns, have also contributed to warming of the river (Federal Energy Regulatory Commission 1989). Algae blooms, although natural to the shallow lakes and marshes of the upper basin, are enhanced by nutrient enrichment from irrigation returns and livestock grazing (Department of Environmental Quality 1988). Heat and suspended organic sediment inputs into the upper Klamath River from agricultural, sewage, and industrial sources are minor compared to the naturally occurring heat and algae that enter the river from Upper Klamath Lake (Department of Environmental Quality 1976). The Upper Klamath River is a water body of concern due to levels of mercury that are elevated but are below standards, criteria, or guidance values. The elevated mercury levels were detected in fish tissue samples. A more detailed discussion of water quality in the upper Klamath River may be found in the *Final Eligibility and Suitability Report for the Upper Klamath River Wild and Scenic River Study* (BLM 1990), the *Final Environmental Impact Statement for the Proposed Salt Caves Hydroelectric Project* (Federal Energy Regulatory Commission 1990), and Department of Environmental Quality's [305(b)] Report.

Section 303 of the Federal Clean Water Act requires the establishment of total maximum daily loads for "water quality limited" stream segments. Areas where water quality requirements are not or would not be met after the implementation of technology-based effluent

Table 3-9. Results of the 1988 DEQ Oregon Statewide Assessment of Nonpoint Source of Water Pollution.<sup>1</sup>

Stream Segment Name	Analytical Watershed	Pollution Type	Severity (Info. source)	Impacted Beneficial Uses	Probable Causes
Klamath River	Klamath-Spencer	Nutrients	Severe problem (observation)	<ul style="list-style-type: none"> <li>- Irrigation</li> <li>- Cold Water Fisheries</li> <li>- Water-Contact Recreation</li> <li>- Aesthetics</li> <li>- Navigation</li> </ul>	<ul style="list-style-type: none"> <li>- surface erosion</li> <li>- water withdrawal</li> <li>- traffic</li> <li>- reservoir storage and releases</li> <li>- altered physical characteristics of stream</li> <li>- bank filling</li> <li>- dredging/aggregate removal</li> <li>- channelization/wetland drainage</li> <li>- irrigation return flows</li> </ul>
		Pesticides	Severe problem (data)		
		Sedimentation	Moderate problem (data)		
		Insufficient Stream Structure	Severe problem (observation)		
		Excessive Plant Growths	Severe problem (data)		
Spencer Creek	Klamath-Spencer/Middle Spencer	Sedimentation	Moderate problem (observation)	<ul style="list-style-type: none"> <li>- Cold Water Fisheries</li> </ul>	<ul style="list-style-type: none"> <li>- surface erosion</li> <li>- timber harvest</li> <li>- road construction</li> </ul>
Long Prairie Creek	Klamath-Spencer	Sedimentation	Moderate problem (observation)		
Miller Creek	N/A	Turbidity	Moderate problem (observation)	<ul style="list-style-type: none"> <li>- Cold Water Fisheries</li> <li>- Other Aquatic Life</li> <li>- Wildlife</li> </ul>	<ul style="list-style-type: none"> <li>- traffic</li> <li>- reservoir storage and releases</li> </ul>
		Sedimentation	Moderate problem (observation)		
		Streambank Erosion	Moderate problem (observation)		
Round Valley Reservoir, Gerber Reservoir, and Willow Valley Reservoir	N/A	Excessive Plant Growths	Moderate problem (observation)	<ul style="list-style-type: none"> <li>- Aesthetics</li> </ul>	<ul style="list-style-type: none"> <li>- not specified</li> </ul>
		Pesticides	Moderate problem (observation)		
Barnes Valley Creek	Barnes Valley	Turbidity	Severe problem (data)	<ul style="list-style-type: none"> <li>- Warm Water Fisheries</li> <li>- Cold Water Fisheries</li> <li>- Other Aquatic Life</li> <li>- Wildlife</li> <li>- Aesthetics</li> </ul>	<ul style="list-style-type: none"> <li>- changes in flow pattern timing</li> <li>- riparian vegetation and bank disturbance, general</li> <li>- elimination of thermal cover to stream</li> <li>- traffic</li> <li>- vegetation removal</li> <li>- decline in alluvial water table</li> <li>- baseflow depletion</li> </ul>
		Low Dissolved Oxygen	Severe problem (data)		
		Nutrients	Severe problem (data)		
		Sedimentation	Moderate problem (observation)		
		Streambank Erosion	Severe problem (data)		
		Decreased Streamflow	Severe problem (data)		
		Insufficient Stream Structure	Severe problem (data)		

<sup>1</sup> Only those waterbodies intersecting BLM-administered lands have been listed.

limitations are said to be water quality limited. A total maximum daily load is the total amount of a pollutant that can enter a waterbody without causing it to violate the water quality standard for that pollutant. Once a total maximum daily load is established, the load is divided into load allocations (that part of the load that is either from natural background sources or from nonpoint sources) and waste load allocations (that part of the load that is allocated to point sources of pollution). The allocations apply to existing and future sources. Once the allowable pollutant loadings have been allocated, various strategies for achieving those loadings would be evaluated and selected (Department of Environmental Quality 1990).

Water quality limited streams are reported in the 1992 Water Quality Status Assessment [305(b)] Report. The Department of Environmental Quality has identified the upper Klamath River upstream from the Keno Dam as being water quality limited for dissolved oxygen and pH (a measure of acidity). Therefore, the Department of Environmental Quality has proposed total maximum daily loads for biochemical oxygen demand and total ammonia, which influence pH and dissolved oxygen levels and contribute to the cumulative effect of point and nonpoint pollution in the river.

The Department of Environmental Quality is in the process of conducting an intensive assessment of water quality and pollution sources in the Klamath River Basin. A local advisory group will be established to help develop a water quality management plan for the Klamath River in cooperation with the Department of Environmental Quality. The Department of Environmental Quality will then propose final total maximum daily loads, implementation strategies, and compliance schedules as part of the water quality management plan. The BLM will continue to implement watershed improvement-related projects on lands within its jurisdiction and will participate as appropriate in developing the Klamath River water quality management plan (Memorandum of Agreement, U.S. Department of Interior BLM and Department of Environmental Quality, 1990).

The City of Klamath Falls has previously submitted applications to the Department of Environmental Quality for a 401 Certification of the Salt Caves Hydroelectric Project. The Department of Environmental Quality denied issuance of this certification based in part on findings that the proposed project would cause increased temperatures in the Klamath River, resulting in violations of state water quality standards. The findings of the Department of Environmental Quality were disputed by Federal Energy Regulatory Commission staff. A subsequent appeal of this decision to the Environmental Quality Commission was made. The

Environmental Quality Commission affirmed denial of certification for the project. The City appealed the Environmental Quality Commission decision and the Oregon Supreme Court upheld the Environmental Quality Commission decision and denied the appeal. The City has submitted a new 401 application based on a modified design.

The Lost River and Miller Creek, two waterbodies downstream from BLM-administered lands, have been designated by the Department of Environmental Quality as water quality limited under section 303(d)(3) of the Clean Water Act. The Department of Environmental Quality has identified the need for further study to verify water quality problems and sources in the Lost River Basin. A management plan and estimated total maximum daily loads for dissolved oxygen, fecal coliform and nutrients could be developed. The BLM will continue to implement watershed improvement projects and participate as appropriate in the development of the management plan's total maximum daily loads for the Lost River (Memorandum of Agreement, U.S. Department of Interior BLM and Department of Environmental Quality, 1990).

The Klamath Falls Resource Area initiated monitoring in 1988 to determine if the Management Framework Plan measures were being followed. The resource area's interdisciplinary monitoring plan was implemented in 1989. The Klamath Falls Resource Area was established in 1988, and very limited to no water quality monitoring data is available prior to 1988 for BLM-managed streams in the planning area. No monitoring of the effects of fertilization on water quality has been performed, because fertilization activities have not occurred since 1988. An aquatic macroinvertebrate (see Glossary) sampling program was implemented in the summer of 1991. Aquatic macroinvertebrates are used as indicators of water quality and stream health, and to assess the impacts of a variety of land management activities, including effects from mining, logging, road construction, grazing, and wildfire. Table 3-10 shows some results, to date, of stream and macroinvertebrate monitoring. These results indicate that nonpoint source pollution is occurring within the watersheds of streams sampled, and that activities on private lands are affecting BLM-administered stream segments.

Interpretation of the health and integrity of aquatic ecosystems is based on a number of aquatic macroinvertebrate indices, and physical habitat and water chemistry data. Information about the numbers and types of aquatic organisms is used to perform calculations (metrics) that provide insight into water quality

**Table 3-10. Results of Stream and Macroinvertebrate Sampling on BLM-administered Lands in the Resource Area.**

Analytical Watershed	Stream Name	Sample Site Number	Date	MHBI <sup>1</sup>	BCI <sup>2</sup>	Indications (Organic Enrichment-MHBI, General Water Quality-BCI)
Jenny Creek	Johnson Creek	1	6/92	5.79	N/A	Enriched
Jenny Creek	Cold Creek	1	6/92	2.24	N/A	Slightly Enriched
Jenny Creek	Cold Creek	1	6/93	4.21	70	Enriched, Poor
Middle Spencer	Miners Creek	1	6/92	3.32	N/A	Slightly Enriched
Middle Spencer	Miners Creek	1	6/93	4.09	73	Enriched, Fair
N/A	Antelope Creek	1 (up-stream)				
N/A	Antelope Creek	1	6/92	7.17	N/A	Polluted
N/A	Antelope Creek	1	5/93	6.09	53	Enriched, Poor
N/A	Antelope Creek	2 (down-stream)				
N/A	Antelope Creek	2	6/92	5.25	N/A	Enriched
N/A	Antelope Creek	2	5/93	5.73	58	Enriched, Poor
Barnes Valley	Barnes Valley Creek	1	5/93	7.58	59	Polluted, Poor
N/A	Ben Hall Creek	1	5/93	4.20	56	Enriched, Poor
Klamath-Spencer	Long Prairie Creek	1	6/93	5.39	60	Enriched, Poor
South Hayden	Hayden Creek	1	7/93	5.69	80	Enriched, Good

<sup>1</sup> MHBI (Modified Hilsenhoff Biotic Index): This index is used to detect nutrient enrichment, high sediment loads, low dissolved oxygen, and thermal impacts. It is best at detecting organic pollution. Waters with values 0-2 are considered clean, 2-4 slightly enriched, 4-7 enriched, and 7-10 polluted.

<sup>2</sup> BCI (Biotic Condition Index): This index has been widely used by the U.S. Forest Service and BLM in the western United States. The Biotic Condition Index measures a stream against its own potential and not that of other streams. Waters having a Biotic Condition Index greater than 90 are considered excellent, 80-90 good, 72-79 fair, and less than 72 poor.

conditions. Macroinvertebrate data, when combined with data on aquatic features and water quality, can be useful indicators of the health of stream ecosystem. Macroinvertebrate data are site-specific and average values for large diverse areas should not be used for decisions. Macroinvertebrate data should be used in conjunction with other types of data to provide sound information on the health of aquatic-riparian ecosystems.

The metrics used in analysis of macroinvertebrates have been modified to be more reflective of conditions found in Pacific Northwest streams. Reference values, a "potential" against which streams can be measured against, have been established for ecoregions with the Pacific Northwest. The ecoregion in which the Resource Area is located is the Eastern Cascades Slopes and Foothills ecoregion. This ecoregion is rather large and contains a diversity of stream types. More accurate assessments could be made if reference values are established specifically for the Klamath Basin area. Since few streams have been sampled in this area, it is impossible to compare sites in the resource area against minimally impacted streams of similar habitat type in the Klamath Basin (Wisselman 1991). The BLM

shares its results of macroinvertebrate sampling with the Oregon Department of Environmental Quality to assist them in developing reference values applicable to the Klamath Basin.

Consideration of these macroinvertebrate sampling results in Table 3-10 must consider the following: the effects of a long-term drought in the planning area; the lack of knowledge about natural background sources of water pollution; and the effects of non-BLM landowners which may be influencing water quality at the sampling site. The normal "flushing" out of sediments that occurs during high flows from spring snowmelt was absent in 91-92, which can account for indications of elevated sediment levels in the stream. Although samples were taken relatively early in the summer, flows in the streams sampled were very low. All the above streams receive little to no livestock use under current management. For example, Antelope Creek (both sites) has been excluded from livestock grazing since 1979. More information on the results of macroinvertebrate and other water quality sampling is available at the Klamath Falls Resource Area office.



## Surface Water Quantity

During the last 130 years, Oregon has experienced increasing pressure on its water resources. As the state has developed, the demands for water have grown. While most early water rights were established for irrigation and mining, important new demands have emerged during recent years. The urbanization of the state has resulted in continually expanding needs for municipal water supplies. Growth and economic development have resulted in new demands for commercial and industrial supplies of water. There has been increased recognition of the importance of maintaining adequate streamflows to support fish, provide recreational opportunities, and maintain water quality.

Oregon follows the appropriation doctrine in its state water statutes. The water rights program is administered by the Oregon Water Resources Department. The appropriation doctrine holds that a water right is limited to the quantity of water which is beneficially used without waste. The state statutes provide that beneficial use shall be the basis, the measure and the limit of all rights to the use of the waters of the state. In addition, the statutes establish as state policy the principle that the waters of the state belong to the public for use by the people for beneficial purposes without waste. These statutes apply to all uses of water including agricultural, domestic, industrial, and municipal uses. Recently, the demand for instream flows has increased because of the benefits to the public they provide. In 1987 the Legislature passed a bill which created instream water rights and considers public use as a beneficial use. Instream water rights are held in trust by the State of Oregon to maintain water instream for public use. They may be initiated upon application from the Department of Fish and Wildlife, the Department of Environmental Quality, or the Parks and Recreation Department. Instream water rights may also be established by the conversion of minimum streamflows or the transfer of an existing appropriation to an instream water right.

Until recently, continued consumptive use of the state's water resources generally was limited only by the availability of supplies. However, many streams and basins throughout Oregon are now closed to further surface or groundwater appropriation. In other areas where significant development has occurred, groundwater aquifers are being stressed. This situation is contrary to the belief held by most that the state has an abundance of water. To address this, the State has adopted a Water Resources Policy (Oregon Administrative Rule 690, Division 400). The rules affecting land management activities include: Introduction/Definitions (1992); Instream Flow Protection (1990); Protection of

Water Resources on Public Riparian Land (1990); Conservation and Efficient Water Use (1990); Water Allocation (1992); and Water Storage (1992).

The BLM uses water in a variety of land management activities. Some of these uses are consumptive, such as recreation, prescribed fire, road maintenance/construction, administrative facilities and irrigation. Other uses, which are now emerging as issues (fish and wildlife habitat, Threatened and Endangered fish species, riparian-wetland area protection, Wild and Scenic rivers, Federal Reserve rights), are typically instream and non-consumptive. Under certain circumstances, the Klamath Falls Resource Area may claim Federal Reserved Rights based upon Public Water Rights established by Executive Order. These claims would be made in accordance with the Klamath Basin Adjudication procedures, which are still being developed. Reserved rights would be claimed in support of multiple use management of public lands in the Klamath Falls Resource Area. It is expected that competition for surface and groundwater will increase, and with it conflicts between "traditional" uses of water (such as irrigation) and the instream needs of fish and wildlife. BLM will be a key player in the future of the development of water uses in Oregon and will cooperate with water users on adjoining lands to resolve water use conflicts.

Numerous domestic and irrigation water rights on and downstream from BLM-administered lands have been filed. More detailed information on water rights is available from the local Watermaster. The City of Klamath Falls filed a water rights application with the Water Resources Department for use of upper Klamath River water (from the John C. Boyle Powerhouse to the Oregon-California state line) for hydroelectric power generation for the proposed Salt Caves hydroelectric project in 1989. The Oregon Department of Parks and Recreation and the Oregon Department of Fish and Wildlife applied for an instream water right on the same stretch of river, also known as the Klamath Scenic Waterway, in 1990. Based on the release regime from the J.C. Boyle Powerhouse, the application requests 1,500 cubic feet per second for recreation and 550 cubic feet per second (not additive) for fish population and habitat.

The Oregon Department of Fish and Wildlife has filed for instream water rights on the following streams: Spencer Creek (from Tunnel creek to mouth); Jenny Creek (from Johnson Creek to Keene Creek); and the Klamath River (from the Keno Dam to J.C. Boyle Reservoir and from the Boyle Powerhouse to the state line (Oregon Department of Fish and Wildlife 1992).

The Bureau of Reclamation's Klamath Project diverts water from the Klamath River near the City of Klamath

Falls for agricultural irrigation. Rights for all unappropriated waters in the Klamath River Basin were claimed by Reclamation for this project in the early 1900s. The Water Resources Department is in the process of adjudicating all water claims in the Basin. Water in the Klamath Basin is presently over-appropriated in its upper reaches (Del Sparks, Klamath County Watermaster, pers. comm. 1990); the lower reaches (below Upper Klamath Lake), in normal to wet years have an adequate supply due to water being returned to the system from upstream agricultural diversions in the Klamath Project. A water budget, reflecting a drought scenario, was developed by Reclamation that indicates a deficit (demand greater than supply) of 124,800 acre feet projected for the Upper Klamath Basin (Klamath River Basin Fisheries Task Force 1991).

## Biological Diversity

Biological diversity is the variety of life and its processes. This discussion focuses on the concepts and components of biological diversity and their interrelationships. It covers the following focal components: species diversity, genetic diversity, community diversity, and landscape diversity. In general, the forest land and old growth descriptions refer to the west side and the range land and potential natural community descriptions refer to the east side of the Klamath Falls Resource Area.

During the last 150 years, human activity has significantly changed the natural environment. In the planning area, approximately 17 percent of the BLM-administered forest land is managed replacement stands in areas that have been logged to some extent. Approximately 72 percent is considered to be near-natural stands resulting from natural regeneration after selective logging, and approximately 11 percent remain unentered. However, all of these forest lands have been influenced by human activity to some extent through fire suppression, grazing, water diversion, and habitat fragmentation, as well as by logging.

The BLM-administered non-forest lands support a mix of seral stages from early to potential natural community (see the Vegetation section). Livestock grazing has occurred on much of these lands since the 1870s. While approximately 37 percent of these non-forest communities are classified as late seral stage, less than 0.01 percent of these lands support the potential natural community and have only been slightly affected by livestock grazing.

**Species diversity** is the variety of living organisms found in a particular place. These organisms include plants, birds, mammals, reptiles, amphibians, insects,

and less visible organisms such as soil mycorrhizal fungi. Maintenance of species diversity implies the maintenance of viable populations of each species. Species diversity varies from place to place and changes over time in the same place. For example, the mix of tree species in older forest stands varies by location. In the Klamath Sustained Yield Unit (both Medford and Klamath Falls portions), the average species composition by percent of basal area is Douglas fir 22 percent, pine 15 percent, white fir 57 percent, other conifers 5 percent, and hardwoods 1 percent.

Plant species diversity is partly a function of the variety of plant associations, described in the Vegetation section. Plant species diversity within natural plant communities and communities resulting from intensive management varies by stand age. The species composition of managed forests also differs to some extent from unmanaged forests of the same ages. Unmanaged, natural forests were shaped by ecological processes of wildfire, windthrow, insect attack, and tree disease. Artificial reforestation, primarily using seeds collected from the local seed zone, has emphasized regeneration of the species present before harvest, and has included Douglas fir, white fir, shasta fir, sugar pine, white pine, ponderosa pine, and lodgepole pine. Vegetation control in the past 25 years has reduced competition to young seedlings.

Hardwood composition consists of oak on low elevation dry sites on the west side and of aspen populations in wet sites throughout the planning area.

Heavy use by livestock in the past has resulted in an expansion of early seral species and communities on upland and riparian zones of both forest and non-forest vegetation types. Consequently, there has been a decrease in natural species diversity. Noxious weed invasions are favored by conditions resulting from heavy use of range lands. In some areas, grazing has reduced vegetation cover which has resulted in soil erosion, creating conditions that reduce the probability of a rapid recovery of natural biological diversity. Even where intensive grazing management systems have been implemented, the effects of historic heavy use can still be detected in some areas. Heavy livestock use also reduces available fine fuels in which fires burn, thus reducing fire frequency and contributing to the increased distribution and cover of western juniper and white fir.

Introduction of exotic (alien) plant species has also significantly affected species composition. Introduced species considered to be noxious weeds include Canada thistle, dalmatian toad flax, leafy spurge, Mediterranean sage, musk thistle, poison hemlock, puncture vine, rhus skeletonweed, Russian knapweed,



St. Johnswort, Scotch thistle, Spanish thistle, tansy ragwort, wavyleaf thistle, western water hemlock, and yellow star thistle.

Native American cultures affected the distribution of plant and animal species through hunting and the use of fire. European settlers affected animal species diversity through trapping and hunting.

**Genetic diversity** is the variety within and among populations of a species. The number of genes within a specific species can range from about 1,000 in bacteria, 10,000 in fungi, to more than 400,000 in flowering plants (Wilson 1988). Approximately 300 acres of BLM-administered land have been planted with genetically-selected trees. The consequences of using genetically-selected trees are uncertain. Tree breeding programs are designed to prevent excessive narrowing of gene pools. Artificial reforestation has the potential to affect the genetic component of forest stands, whether or not the seed used is the result of tree improvement. Changes in the genetic makeup of populations in any given area could reduce their ability to adapt to changing environmental conditions.

Genetic diversity of the planted conifer stands established in recent years varies, depending on how many seed trees were used as sources for the planted seedlings, how many natural seedlings established themselves in the stands, and the compatibility of planted seedlings with the site. Selection and storage of seeds from specific seed zones and elevations was carried out to maintain local genetic diversity and assure site adaptability of seedlings. See Appendix O for further discussion.

**Community diversity** is the variety of species (both composition and relative abundance) and ecological processes that occur in different physical settings. Old growth forests, riparian zones, and upland meadows are examples of communities. Local communities function together and together are the building blocks of ecosystems. Classification of communities into plant associations is incomplete on BLM-administered lands, but for purposes of this Resource Management Plan/Environmental Impact Statement, the BLM has aggregated plant communities with similar characteristics into major plant groupings (see Vegetation section).

Special habitats or unique communities add to community diversity. The areas include approximately 4,480 acres of talus slopes, ponds, bogs, and meadows on BLM-administered land. Riparian-wetland areas are particularly important to biological diversity. The current situation for these areas is discussed in the Riparian-Wetland Area section of this chapter. The 953 acres of

hardwood stands provide an important element of diversity, as does the hardwood component of conifer stands. One of the major plant groups in the southwest portion of the planning area includes white oak, a hardwood species, as a codominant in the canopy. The communities within this major plant group contribute significantly to the biological diversity of both the planning area and the western Oregon region.

**Structural diversity.** Plant and animal species vary by seral stage in natural ecosystems. Early seral communities usually have the largest number of higher (vertebrate) animal species and high representation of sun-tolerant, pioneer plant species, such as grasses. As succession progresses, the number of species declines and the species present change. In forest communities, species diversity increases again as the old growth stage is approached, but the species mixture differs from the early and mid seral stages. The old growth stage supports shade-tolerant plant species and tends to be the richest in insect species, lichens, fungi, and micro-flora and fauna. The large trees support and shelter these organisms with favorable temperature and moisture regimes. There are greater amounts of non-living organic material. Old growth, typically found in climax and subclimax forests, is more diverse in structure and species composition within the stand than younger, closed-canopy seral stages. For the purpose of interpreting the existing forest inventory, the BLM has defined old growth forest as stands that are at least ten percent stocked with trees 200 years or older and that occupy at least ten acres (this definition only applies to the Klamath Falls Resource Area's west side). While there is a correlation between habitat condition and age class, the actual condition of older age class forests is quite variable.

A preliminary ecological definition for old growth Douglas fir and mixed conifer forests was developed by U.S. Forest Service researchers (Old Growth Definition Task Group 1986). Interim ecological old growth definitions for Pacific Northwest vegetation series have been developed by U.S. Forest Service ecologists (U.S. Forest Service 1993). The BLM has no inventory showing which stands meet those U.S. Forest Service definitions, although an inventory based on the canopy characteristics in the preliminary definition has been proposed.

Structure in an ecosystem or community is the relationship of physical size, height, and vertical stratification of vegetation. It relates to ecological processes such as nutrient cycling, nitrogen fixing, forest succession, incorporation of organic matter into soils, and predator-prey relationships. The most obvious differences between seral stages are differences in vegetation structure, which creates habitat for a variety of organisms and

influence nutrient cycling and other functional processes. Structures retained from later seral stages to the early seral stage serve as biological legacies. In unmanaged vegetation, such retention varies between sites.

Structural diversity is lower during the mid and late seral stages of natural forest stands than at other stages of successional development (Franklin and Dymess 1973, Long 1977, Franklin et al. 1981). Older forest stands provide key animal habitat structures, such as snags, broken-topped trees, and fallen trees, and exhibit a more open canopy than younger seral stages. The younger managed stands typically have the lowest structural diversity due to timber management activities, particularly those of the last 35 years, which have substantially diminished the levels of snags and of dead and down woody material. However, large differences exist from stand to stand in the extent to which dead and living structures survived disturbance and carried over into the new stand. Harvesting in recent years left these components of structural diversity, but at levels below those which occur after natural disturbance.

Vertical diversity is provided by tree heights and canopy layers (see Table 3-11). Young, managed stands, particularly those without biological legacies, often have only one canopy layer, and those stands that have reached canopy closure have little understory. Thinning of young, managed stands has controlled their density, but most managed stands retain a more closed canopy than naturally thinned, unmanaged stands.

The size and frequency of canopy gaps and the degree of canopy closure influence species composition, successional dynamics, nutrient cycling, and wildlife habitat. Canopy gap formation becomes significant in the mature seral stage and stands begin to develop

multiple canopies as reproduction begins in the gaps. Disturbance frequency and severity is the primary determinant of gap formations in an ecotype (Spies et al. 1990). Further decreases in canopy cover have resulted from partial cutting of many mature and old growth stands. The death and fall of canopy trees are major influences on the structure and dynamics of forest ecosystems. Snags provide habitat particularly for cavity users and are discussed in the Wildlife section of this chapter. Dead and down woody material provides habitat for many species, including decomposers, that are considered critical to the overall health of the forest. The Jackson and Klamath Sustained Yield Units includes an average of 5.7 snags per acre that are 11 to 25 inches in diameter at breast height and 2.6 snags per acre that are over 25 inches in diameter at breast height, as well as 35.4 tons per acre of dead and down logs (42 pieces totalling 1,105 feet in length).

The potential natural communities in non-forest vegetation types are more diverse in structure and species composition than the early seral communities associated with over-utilization by livestock. The potential natural communities is defined as the vegetation community that would become established if all successional sequences were completed without human interference under the present environmental conditions. The lower structural and species diversity of the early seral stages of non-forest communities on both upland areas and riparian zones, results in diminished wildlife habitat diversity (BLM 1990, Schulz and Leininger 1990). The arid environment supporting these non-forest communities results in a long recovery period after disturbance of the vegetation, thus some of the lands currently under intensive grazing management regimes still exhibit low structural diversity due to historic grazing practices.

**Table 3-11. Average Structural Characteristics of Forest Vegetation in the Klamath Sustained Yield Unit (Medford and Klamath Falls).**

Avg. Dia. (Inches)	Avg. TPA <sup>1</sup> Over 30 Inch	Avg. Percent of Closure	Avg. Number of Canopy Layers
9.5	8.5	94	2.7
7.6	9.3	91	2.6
11.0	6.7	79	2.0

<sup>1</sup> Trees per acre

### Chapter 3 - Affected Environment

Of all the functional mechanisms responsible for shaping plant communities, disturbance events are particularly significant. These events reset plant succession over large areas or in patches and prevent succession from continuing to the theoretical climax condition on most sites. They include wildfires, wind-throw, insect attack, and plant diseases. Fires have been the predominant events and have played a major role in plant succession. In mixed conifer communities on the west side of the planning area, moderate intensity surface fires occurred approximately every 20 to 50 years under natural conditions. In west side fir communities, the prehistoric cycle of stand-replacing fires (which cause high or complete mortality in an overstory stand of trees) probably averaged between 150 to 200 years. Some stand-replacing fires in western Oregon exceeded 200,000 acres. In the non-forest, dry conifer, and dry conifer/hardwood forest vegetation-types, a more frequent fire return cycle played a major role in the development of the potential natural communities and stand characteristics. Stand-replacing fires were not as common in these forest types because fuel levels were kept relatively low by frequent low intensity surface fires. The prehistoric frequency of fires probably averaged from about 10 to 20 years in the non-forest vegetation types and in the dry conifer communities.

Fire suppression, starting in the 1920s, has progressively reduced the average size of wildfires through suppression of the frequent low to moderate intensity surface fires. In the mixed conifer and fir communities on the west side of the planning area, fire exclusion has led to development of dense underbrush and increased abundance of shade-tolerant species (Stewart 1986). It has also resulted in the encroachment of trees into meadows (Vale 1981). In the non-forest vegetation-types, the effects of fire exclusion have included an expansion of the distribution of western juniper and shrub dominated communities and a contraction of grass and herb dominated communities. In dry conifer forests, fire exclusion has allowed the development of denser stands that include fire-intolerant tree species and an understory dominated by shrubs.

**Landscape diversity** is the geography of size, shape, and connectedness of different communities or ecosystems across a large area, and may be described in terms of the arrangements of stands within a watershed or larger area, or the arrangement of patches within a stand. For example, a landscape interspersed with grasslands, shrublands, meadows, ponds, streams, wetlands, and forests has greater biological diversity than one with a broad expanse of grassland.

Older forest ecosystems and potential natural communities originally occupied a significant, but unknown,

portion of the southern Oregon landscape in a continuous network of habitat. It is estimated that old growth mixed conifer forests occupied at least 50 percent of the original forested landscape, perhaps less for the more fire prone forests (Andrews and Cowlin 1940).

Timber harvesting and grazing have reduced the proportion of the vegetation that exists as later seral stages and have fragmented older vegetation patches into a series of habitat islands that are separated by early to mid seral vegetation or partial cut forests. The near-natural forest and near-natural non-forest communities are highly fragmented because of the checker-board pattern of BLM-administered lands and the history of logging and grazing on these and adjacent lands. Most of the intermingled, privately-owned lands have been logged, cultivated, or extensively grazed, and the near-natural BLM-administered lands are generally in small blocks.

The size of old growth forest patches and the seral stage of adjacent stands have been shown to affect the quality of habitat within old growth stands. All smaller patches and the portions of old growth stands close to the edge of an early seral block are subject to a variety of external influences that alter the conditions found in the interior of such stands, substantially reducing their effectiveness as old growth habitat. These influences include wind (which influences temperature) and predation from species inhabiting adjacent lands. Thus, effective old growth habitat is substantially less than actual old growth acres (Harris 1984). Most studies identifying the extent of such influences have occurred outside the Pacific Northwest. Harris (1984) concludes that edge effects extend approximately 600 feet into old growth stands from adjacent clearcuts due to changes in environmental parameters, such as light, temperature, and relative humidity; and that old growth must exceed 1,200 feet across and 26 acres before interior old growth habitat begins to be retained with all old growth characteristics intact. Chen, Franklin, and Spies (1990) indicate that the effect of edge on relative humidity extends 790 feet into old growth stands. Other analysts have concluded that effective habitat starts about 400 feet from adjacent clearcuts. The Wilderness Society and the US Forest Service have used 400 feet in some recent analyses.

The extent of fragmentation of older forest habitat is shown in Table 3-12. Interior habitat shown in Table 3-12 is habitat at least 400 feet from adjacent lands that either have forest stands younger than 70 years old or that are private lands. Even many of the largest blocks of old growth contain little interior habitat due to the Swiss cheese effect created by harvested patches in their interior.

Table 3-12. Existing Older Forest Blocks.

Block Size (acres)	<i>West Side</i>					
	Old Growth (Age 200+)		Total Old Growth and Mature		Effective Old Growth Habitat	
	No. of Blocks	Total Acres	No. of Blocks	Total Acres	No. of Blocks	Total Acres
20- 79	26	1,100	41	2,100	8	300
80-299	14	2,200	30	5,200	7	1,200
300-599	4	1,700	10	4,000	0	0
600+	2	1,900	3	4,500	0	0

Block Size (acres)	<i>East Side</i> <sup>1</sup>			
	Old Growth (Age 170+)		Old Growth & Mature Outside the SYU	
	No. of Blocks	Total Acres	No. of Blocks	Total Acres
20- 79	24	827	77	2,727
80-299	4	497	9	989
300-599	0	0	0	0
600+	0	0	0	0

<sup>1</sup> This is commercial forest land and the acres are unit acres.

Harris (1984) suggests that this habitat fragmentation has substantially reduced the population of forest interior animal species such as fishers, wolverines, and lynx, compared to that existing prehistorically; however, Lehmkuhl and Ruggiero (1990) found that correlations between fragmentation and the richness and abundance of animal species in the Pacific Northwest forests were weak.

## Vegetation

The vegetation in the planning area is the result of interacting environmental factors including soils, precipitation, temperature, nutrient availability, elevation, and aspect. Variations occur because of both natural disturbances (such as fire, drought, and wind-storms) and human-caused disturbances (such as logging, grazing, and recreation).



### Chapter 3 - Affected Environment

For the purposes of this plan, vegetation is generally described in zones, which have been adapted from those identified by Franklin and Dyrness in *Natural Vegetation of Oregon and Washington* (1973). The two primary vegetation zones found in the planning area are the shrub-steppe zone and the ponderosa pine zone. The subalpine forest zone and mixed conifer zone are also found, but to a lesser degree.

The ponderosa pine zone is found on the west side of the planning area on the eastern slopes of the Cascade Mountains. The subalpine forest and mixed-conifer zones are also found on the slopes of the Cascade Mountains, but on higher elevations above the ponderosa pine zone. The shrub-steppe zone is found on the east side of the planning area. Small inclusions of desert shrub zone communities are found near the Klamath River and elsewhere within the Klamath Basin.

Upland plant associations within these vegetation zones have been categorized into 10 major plant groupings. Each major plant grouping is an aggregation of plant associations with similar management potentials, the same principal early seral species, and the same late seral dominant species. These groupings, together with the associated seral stages, provide the basis for descriptions of the forest and range land vegetation and associated wildlife habitat.

The following plant groups have been described for the west side of the planning area:

**Ponderosa Pine/Ceanothus/Herbaceous Group.** This is the predominant forest plant group on the west side, lying below and to the east of the mixed conifer zone. Within this grouping, Douglas fir or white fir could be codominant with ponderosa pine in the late seral stage or mature forest. Western juniper may be present, particularly in the transition between the forest communities and the range lands. Frost pockets or drier sites will include or be dominated by lodgepole pine. Early seral stages usually have a strong representation of grass, and without extensive site preparation, bitter cherry or other brush is present in the understory. A diverse grouping with a large variety of shrubs and herbaceous plants, such as huckleberry, Klamath plum, manzanita, bitter cherry, or bitterbrush, may be present in early and later seral stages. Variation in species composition and successional changes within this plant group depends upon frost, fire history, soils, and elevation.

**Shasta Fir/Shrub/Herbaceous Group.** This plant group is largely limited to the higher elevations (above 5,500 feet) of the Klamath Plateau.

Natural stands are usually dense Shasta fir communities with chinquapin as a primary hardwood shrub or small tree species. Depending on elevation, Douglas fir, western white pine, white fir, and mountain hemlock are often present. Fire is infrequent and shasta fir may succeed itself in natural stands following windthrow. Natural regeneration after an understory fire usually occurs easily, in fact, some type of disturbance appears to be necessary for regeneration to occur. Grass and herbaceous vegetation is plentiful in the early seral stage and occupies the site without disturbance.

Pacific yew is an understory species found in this grouping. The bark of the Pacific yew is a proven source of the substance Taxol, which has considerable promise in treating ovarian cancer. To assure a sustainable source of supply, harvest restrictions have been imposed as described in Chapter 2 of this Resource Management Plan/Environmental Impact Statement (also see Appendix B for more information).

**Douglas Fir-Ponderosa Pine/Ceanothus/Herbaceous Group.** This is the predominant plant group of the Cascade Mountains above the lower slopes. Ceanothus is a significant competitor with conifers as are manzanita and other brush species. Meadows or ponderosa pine stands may form late seral communities on flatter slopes because of local variation in frost severity or soil and drainage variations. White oak-ponderosa pine/manzanita/grass groupings may be present as inclusions because of local soil variation. White fir is usually present and may be locally a codominant in the stand or may form nearly the entire stand on parts of the Klamath Plateau. Brush in competition with conifers largely affects growth rather than survival, but severe grass competition in the early stage of a stand may be locally significant and may reduce seedling survival. Frost-prone areas within this grouping appear to follow a successional pattern in which ponderosa pine provides frost protection for the subsequent development of Douglas fir or white fir stands. Introduced annual or perennial grasses are often present in this grouping.

**White Oak-Ponderosa Pine/Manzanita-Wedgeleaf/Grass Group.** This plant group occurs on the lower slopes of drainages and valley bottoms in the Klamath Basin. These sites are usually classified as woodland or non-forest, and are not suitable for timber production. Originally, these areas were pine-oak savannahs where manzanita, wedgeleaf brush, or perennial grass species were dominant, depending on the fire frequency of the specific site. To some

extent, original vegetation communities were maintained by periodic fires. The Klamath River drainage plant groups contain plant species of the Great Basin. This plant group currently shows the effects of unregulated grazing, fires, and other impacts of humans prior to BLM management. These effects include the presence of numerous white oak sprouts, manzanita brushfields, or introduced annual grasses.

The following plant groups have been described for the east side of the planning area:

**Sagebrush Group.** The sagebrush group is the largest plant group on the east side. The soils are very stony and shallow. The principal forage species are bluebunch wheatgrass, Sandberg bluegrass, squirrel tail, Idaho fescue, and cheatgrass. In deteriorated sites at lower elevations, medusa head, cheatgrass, and Japanese brome dominate. Rabbitbrush is scattered throughout this plant group. Shrubs comprise 50 percent of the vegetation cover, forbs 35 percent, and grass 15 percent.

**Juniper-Bunchgrass Group.** This group occurs on very shallow soils with a great number of rocks and rock outcrops. Juniper is a strong competitor for soil moisture, in fact the dominance by juniper has eliminated much of the understory cover in some areas. The understory composition is approximately 60 percent grass, 30 percent shrubs, and 10 percent forbs. The grass species represented are bluebunch wheatgrass, Idaho fescue, squirrel tail, and cheatgrass. Shrub species are composed of thickets of mountain mahogany with small openings of sage and bitterbrush.

**Conifer Group.** Timber is scattered over the east side depending upon exposure and elevation. Generally, it is located along drainages and at the highest elevations of the area, in soils that are shallow to deep, stony, and finely textured. This group contains ponderosa pine, juniper, mountain mahogany, bitterbrush, ceanothus, and squaw carpet. Some white fir, incense cedar, sugar pine, and Douglas fir grow in the higher reaches of Swan Lake Rim and Bryant Mountain. The major forage species are Sandberg bluegrass, Idaho fescue, squirrel tail, needlegrass, and *Carex* spp. Some important shrubs for deer browse include bitterbrush, ceanothus, mountain mahogany, serviceberry, and chokecherry. The understory vegetation cover is

composed of 45 percent grasses, 40 percent shrubs, and 15 percent forbs.

**Mountain Brush Group.** This group occurs on shallow to deep, stony, and finely textured soils. The mountain brush group has a heavy overstory of mountain mahogany, ceanothus, manzanita, snowberry, and chokecherry. The brush overstory cover is as high as 100 percent in places. Large brushfields of mountain mahogany, ceanothus, serviceberry, and chokecherry are found on Stukel Mountain and Swan Lake Rim as a result of past fires. The most abundant grass species are Idaho fescue, needlegrass, bluegrass, and squirrel tail.

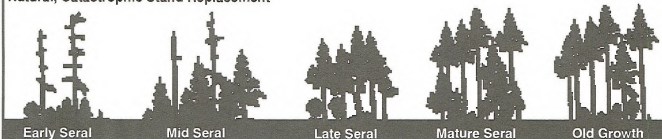
**Grass Group.** Most of this group consists of seeded areas. Approximately 1,500 acres have been seeded to clover, timothy, and wheatgrass in the Round Valley, Midway, and Dog Hollow irrigated pastures. Approximately 2,250 acres have been seeded to legumes, browse, and wheatgrass in the Willow Valley, Harpold, and North Harpold areas. The remaining grass group is limited to old burn areas where cover is dominated by cheatgrass and medusa head.

**Meadow Group.** This very important range type is generally found in deep, dark, and fertile soils. The wet and dry meadows are very important for duck and goose nesting from March to early July. Major forage species in this type include the *Poa* species, *Carex* species, redbud, mountain mahogany, hairgrass, clover, dandelion, and knotweed. Generally, the meadows are filled with water until the end of May, then the water recedes, offering feed until August.

Five seral stages have been described for each major upland plant grouping on the west side. The speed of seral changes varies within the planning area from better to poorer sites and between major plant groupings. For analytic purposes, changes are similar enough for all upland vegetation on the west side to have a common duration. The five seral stages on the west side are early, mid, late, mature, and old growth. Similarly, there are four seral stages on the east side, which are early, mid, late/mature, and potential natural community (see glossary). Figure 3-1 shows typical west side seral stages. Figure 3-2 shows seral stages for a ponderosa pine stand, and Figure 3-3 shows seral stages for a typical east side plant grouping.



### Natural, Catastrophic Stand Replacement



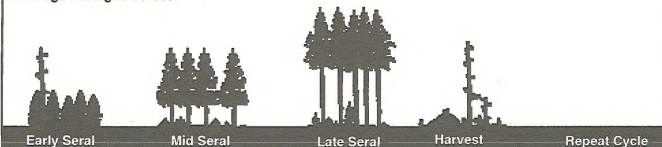
The first seral stage consists of dead trees, down trees, forbs, brush, and conifer seedlings (and very few living trees which serve as a seed source). Succession progresses in a more or less even-aged sequence, with vertical and fine grained diversity developing in the mature seral state and being fully expressed in the old growth stage.

### Natural, Partial Stand Replacement



This succession path is very common in southwestern Oregon. The first seral stage consists of a patchwork of surviving green overstory trees, dead trees, and down trees. Patches contain young conifers, forbs, and hardwoods. Development is uneven-aged and patchy with vegetation developing in the understory and in patch openings, while overstory trees slowly die, turn into snags and fall.

### Even-age Managed Forest



This successional path begins after nearly complete removal of conifer volume in logging, leaving a few snags and a small amount of down wood. Development is even-aged and is truncated by harvest in short rotations.

Figures 3-1. Typical West Side Seral Stages.

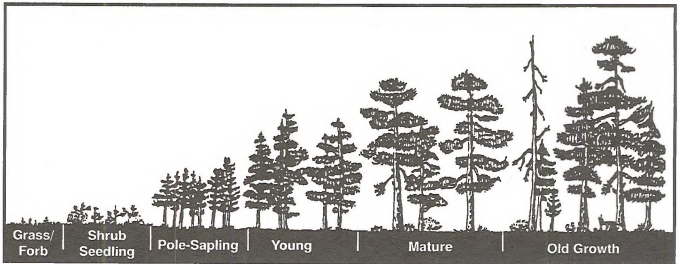


Figure 3-2. Ponderosa Pine Community Seral Stages (Source: Fremont National Forest FEIS).

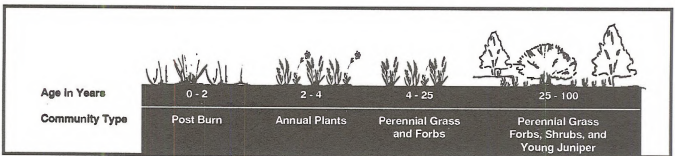


Figure 3-3. Successional Stages of East Side Shrub/Grass Plain Community (Adapted from The Range of Our Vision)

### Chapter 3 - Affected Environment

Dominant seral vegetation for each plant grouping is displayed in Table 3-13. Acres of major plant groupings and seral stages is shown in Table 3-14. Map 3-4 in the map packet displays the major plant groups and location of the mature, old growth, and potential natural community seral stages.

Smaller vegetation communities may occur within the major upland plant groupings. These communities are associated with marshes, swamps, riparian zones, wet and dry meadows, rock cliffs, talus slopes, and patterned ground. Individual plant species in these communities are adapted to the unique environmental or physical conditions present in those locations, and can be considered special habitats. Although these

special habitats account for a small percentage of land in the planning area, they contain a large percentage of the plant species, including the majority of the Klamath Falls Resource Area's 16 special status plant species.

Fire, grazing, drought, the introduction of noxious weeds, and other human-caused disturbances have played a major role in plant succession. This role is described in the Biodiversity section.

**Special Forest/Natural Products.** Special forest/natural products are located throughout the resource area. Numerous plant species are harvested for personal and commercial use. A partial listing of existing or potential special forest/natural products and

**Table 3-13. Dominant Seral Vegetation by Major Plant Group.**

<i>West Side</i>					
Plant Group (years)	Early (0-10)	Mid (20-40)	Late (50-90)	Mature (100-190)	Old Growth (200+)
P/Ce/Gr	G-He-Sh	C-Sh	C	C	C
SF/Sh/Hb	G-He	C-Sh	C	C	C
DP/Ce/Hb	He-Sh	C-Sh	C	C	C
WP/EB/Gr	G-Sh	G-Sh	Sh	Sh	C

<i>East Side</i>				
Plant Group	Early	Mid	Late/Mature	PNC
Sagebrush	Sh	G-Sh	G-Sh-He	G-Sh-He
Juniper-Bunchgrass	Sh	G-Sh	G-Sh-He	G-He
Conifer	G-He-Sh	C-Sh	C	C
Mountain Brush	G	G-Sh	Sh	Sh
Grass	G	G	Sh	Sh
Meadow	Sh	Sh	G	G-He

**Abbreviations used in this table:**

P/Ce/Gr = Ponderosa Pine/Ceanothus/Grass Group  
SF/Sh/Hb = Shasta Fir/Shrub/Herbaceous Group  
DP/Ce/Hb = Douglas Fir-Ponderosa Pine/Ceanothus/Herbaceous Group  
WP/EB/Gr = White Oak-Ponderosa Pine/Manzanita-Wedgeleaf/Grass Group  
G = Grass      He = Herb      Sh = Shrub      C = Conifer  
PNC = Potential Natural Community

Table 3-14. Acres of Major Plant Groups and Seral Stages.

<i>West Side (acres)</i>						
Plant Group (years)	Early (0-10)	Mid (20-40)	Late (50-90)	Mature (100-190)	Old Growth (200+)	Total
P/Ce/Gr	1,880	3,810	11,140	5,410	1,890	24,130
SF/Sh/Hb	1,470	1,410	2,660	3,460	6,560	15,560
DP/Ce/Hb	180	620	1,490	300	730	3,320
WP/EB/Gr	1,380	20	490	2,290	200	4,380

<i>East Side (acres)<sup>1</sup></i>						
Plant Group	Early	Mid	Late/Mature	PNC	Total	
Sagebrush	1,610	30,310	26,080	10	58,000	
Juniper-Bunchgrass	6,250	48,550	15,000	0	69,800	
Conifer	850	9,900	10,690	0	21,440	
Mountain Brush	1,300	8,300	2,440	0	12,040	
Grass	220	2,370	1,890	0	4,480	
Meadow	0	860	350	0	1,210	

<sup>1</sup> East side lands outside the commercial forest lands were remapped in 1993-1994, and updated acres are shown here.

**Abbreviations used in this table:**

P/Ce/Gr = Ponderosa Pine/Ceanothus/Grass Group  
 SF/Sh/Hb = Shasta Fir/Shrub/Herbaceous Group  
 DP/Ce/Hb = Douglas Fir-Ponderosa Pine/Ceanothus/Herbaceous Group  
 WP/EB/Gr = White Oak-Ponderosa Pine/Manzanita-Wedgeleaf/Grass Group  
 PNC= Potential Natural Community

their uses are found in Table 3-15. Although qualitative information exists for most special forest/natural products, quantitative information for many of them is not available. Inventories of special forest/natural products have not been done.

Documentation of these products occurs when they are harvested under permit. Those that have been sold for harvesting under permit between Fiscal Years 1987 and 1991 in the Klamath Falls Resource Area are shown in Table 3-16.

Special forest/natural products are legally removed from the forest through the use of permits or without permit for

certain amounts of specific special forest/natural products (under section from 43 Code of Federal Regulations 5500 and/or 8365).

## Riparian-Wetland Resources

Riparian-wetland areas are among the most productive, diverse, and resilient ecosystems in the planning area. Riparian-wetland areas can extend through

Table 3-15. Partial Listing of Existing or Potential Special Forest/Natural Products in the Klamath Falls Resource Area and their Possible Uses.

Existing/Potential Special Forest/Natural Products	CR	CO	FL	FO	GR	LP	PH	PO
Common cattail	X		X	X	X		X	
Ferns					X	X		
Lichens						X		
Orchid family ( <i>Orchidaceae</i> )						X		
Mushrooms				X				
Mosses					X		X	
Foxglove <sup>1</sup>							X	
Yarrow			X	X	X	X	X	X
Ocean spray			X					
Spreading phlox						X		
Currants				X			X	X
Gooseberries				X		X	X	X
Manzanita					X	X		
Oregon grape	X			X	X	X	X	
Golden chinquapin					X	X		
Prince's pine					X	X	X	
Lily family ( <i>Liliaceae</i> )						X		
Incense cedar			X		X	X		X
Western white pine		X	X		X	X	X	
Sugar pine	X	X	X	X		X	X	
Ponderosa pine	X	X	X			X	X	
Oregon white oak	X		X			X		
Willows	X			X		X	X	
Douglas-fir		X	X		X	X	X	X

<sup>1</sup> May be poisonous in some forms to humans.

## Abbreviations Used:

CR - Crafts CO - Cones FL - Floral GR - Greenery LP - Live Plants FO - Food resource PO - Potpourri PH - Pharmaceutical

entire drainage systems from the smallest intermittent headwater streams to the largest rivers. Although riparian-wetland areas may occupy only a small percentage of a watershed, they can be the most important part for many values and resources, from livestock and wildlife forage to timber production. The size and extent of riparian-wetland areas is largely dependent on physiographic and geomorphic factors (such as alluvial flood plain versus v-shaped bedrock valley), topography, stream conditions (pools, riffles, streambanks, and instream structure and debris), and the presence of moisture-holding soils.

Riparian-wetland systems are grouped into two major categories: standing water habitat (such as lakes, ponds, seeps, bogs, and meadows - lentic) and running water habitat (such as rivers, streams, and springs - lotic). Wetlands are defined as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and which, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, shallow swamps, lake bogs, muskegs, wet meadows, estuaries, and riparian areas. Riparian areas are a form of

wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.

Although there are technical distinctions between riparian areas and wetlands, they are linked for discussion purposes throughout this Proposed Resource Management Plan/Final Environmental Impact Statement.

The plant species found in riparian-wetland areas differ considerably from those in the adjacent uplands because of physical and biological characteristics, such as proximity to water, stream gradient, elevation, soil, aspect, topography, water quantity and quality, and type of stream bottom. Healthy riparian-wetland vegetation provides hydrologic benefits through water quality enhancement, attenuation of flood peaks, erosion control, and increased storage of water in streambanks.

Forested riparian-wetland areas on the west side are generally more complex than in adjoining upland plant communities because they contain larger trees, more conifer and hardwood species, more large woody debris, and more structural and vertical diversity. The riparian-wetland vegetation usually includes hydrophytes and species that also occur in drier sites. Herbaceous plants and shrubs are typically more abundant in riparian-wetland areas than in adjacent upland plant communities.

Riparian-wetland areas on the east side are characterized by a complex of grasses, rushes, sedges, forbs, and patches of woody types, such as rose, willow, and quaking aspen. These riparian-wetland areas contrast markedly with the surrounding upland/dry site vegetation, which typically consist of conifer, juniper, brush, and/or sagebrush communities.

Wetland vegetation throughout the resource area may also include immersed species, such as cattails, skunk cabbage, rushes, sedges, and grasses, or tree-form species, such as willow, cottonwood, or western red cedar. Wetland vegetation is not particularly susceptible to natural disturbance, such as wildfire, and tends not to show successional or seral stages. Most changes in the vegetation are the result of human actions, such as the draining or filling of swamps, marshes, or other wetland areas.

**Table 3-16. List of Special Forest/Natural Products Sold Under Permit During Fiscal Years 1989 to 1993.**

Klamath Falls Resource Area Fiscal Years 1989 to 1993			
Product	Unit of Measure	Issued Permits	FY89-93 Amounts
Sawtimber	MBF <sup>1</sup>	7	1,745.00
Pulpwood	MBF <sup>1</sup>	1	20.00
Line Posts	Number	1	30.00
Fuelwood	Cords	90	1,145.00
Cones	Bushels	5	175.00
Christmas Trees	Number	186	7,645.00
Boughs	Pounds	8	627.00
Mushrooms	Pounds	6	75.00
Total Permits/Amounts		304	\$11,462.00

<sup>1</sup> Thousand board feet

In December 1990 the Protection of Water Resources on Public Riparian Lands Policy (Oregon Administrative Rule 690-410-050) was adopted by the State of Oregon. This policy requires management activities in riparian areas on public lands to maintain or improve riparian conditions that support water-related functions, consistent with the constitutional or statutory purposes of the public land. The State is considering including wetlands in the definition of waters of the state, for which differential designated uses, water quality standards, and other regulatory measures would be developed (Department of Environmental Quality 1992).

In 1987 the Oregon/Washington Riparian Enhancement Plan was implemented to guide planning, management, and development of riparian-wetland enhancement projects; this plan is being updated for implementation through 1997.

In January 1991 the BLM released its Riparian-Wetland Initiative for the 1990s, which sets a series of nationwide goals and strategies to achieve healthy conditions on BLM-administered riparian areas and wetlands. The following four goals were established:

- ◆ Restore and maintain riparian-wetland areas so that 75 percent or more are in proper functioning



condition by 1997. The overall objective is to achieve an advanced ecological status, except where resource management objectives, including proper functioning condition, would require an earlier successional stage.

- ◆ Protect riparian-wetland areas and associated uplands through proper land management and avoid or mitigate negative impacts. Acquire and expand key areas to provide for their maximum public benefit, protection, enhancement, and efficient management.
- ◆ Ensure an aggressive riparian-wetland information/outreach program, including providing training and research.
- ◆ Improve partnerships and cooperative restoration and management processes in implementing the riparian-wetland initiative.

The BLM expresses the status of riparian-wetland areas in terms of functioning condition and ecological status. Functioning condition is an important measure of the health of riparian-wetland areas. Improving the functioning condition of these areas is the focus of BLM's riparian-wetland restoration goal. Riparian-wetland areas have the potential to function properly at all plant successional stages. The BLM reports annually to the Congress on its progress towards its goal of riparian-wetland restoration. The format of these reports uses the following definitions:

- ◆ **Riparian-Wetland Areas with Management:** Areas where the BLM has established specific riparian-wetland objectives and have implemented or are implementing management actions to meet the objectives.
- ◆ **Riparian-Wetland Areas Without Management:** Areas where management is in place but does not have specific objectives for riparian-wetland management, or where no specific management exists.
- ◆ **Proper functioning condition:** Riparian-wetland areas are functioning properly when adequate vegetation is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality; filter sediment and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding,

and other uses; and support a greater biodiversity. The functioning condition of riparian-wetland areas is a result of the interaction among geology, soil, water and vegetation.

- ◆ **Functional-At Risk:** Areas that are in functional condition but an existing soil, water, management, or vegetation attribute makes it susceptible to degradation.
- ◆ **Nonfunctional:** Areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows, and thus are not reducing erosion, improving water quality, etc. as listed above. The absence of certain physical attributes, such as having a floodplain where one should be, are indicators of non-functioning conditions.
- ◆ **Unknown:** Areas that lack sufficient information to make any form of determination.

Along with functioning condition, the BLM expresses the status of riparian-wetland areas in ecological terms. In many cases, riparian-wetland areas will provide functional benefits if they are in the late seral to potential plant community stage. Therefore, the BLM has the general goal of achieving advanced ecological status, except where resource management objectives would require an earlier successional stage. For example, vegetation diversity may not occur at the potential plant community stage. Through site-specific activity plans, the BLM determines the most desirable riparian-wetland plant community for meeting management objectives.

Table 3-8 shows the number of stream miles by stream order for each analytical watershed. Streams that are order 3 and greater are particularly important, largely because the riparian-wetland areas along these streams often retain water throughout the year. The location by stream, general riparian-wetland condition, and acreage of streamside riparian-wetland areas on BLM-administered lands in the planning area are shown in Table 3-17.

Mature riparian-wetland areas contribute to a high level of aquatic diversity and provide primary habitat for several wildlife species. Standing riparian-wetland vegetation helps regulate water temperature through shading and provides major life requirements, such as nesting, roosting, cover habitat, and food sources for a variety of terrestrial and aquatic animals (Brown 1985). Mature riparian-wetland vegetation has the structural components to maintain water quality, lessen peak flood flows, control erosion, and increase groundwater recharge. Downed riparian-wetland vegetation in a

Table 3-17. Streamside Riparian-Wetland Area Characteristics.

Name of Streamside Riparian-Wetland Area on BLM-Administered land	Acres of Riparian <sup>1</sup>	Riparian Characteristics/Conditions (Stream Miles)		
		Properly (Functioning)	(Functional - at Risk)	(Nonfunc- tioning)
<i>West Side <sup>2</sup></i>				
Clover Creek	12		0.1	0.5
Cold Creek	3	0.3	0.4	
Edge Creek	1		0.2	
Hayden Creek	66		1.6	0.6
Johnson Creek	63	2.2		
Long Prairie Creek	31		0.3	0.8
Miner's Creek	48		2.9	
Spencer Creek	23	1.9	0	
Tunnel Creek	unknown		0.1	
West Fork Johnson Creek	unknown		1.6	
Sheepy Creek	16		unknown	
Rock Creek	unknown		unknown	
Upper Klamath River	101		unknown	
Onion Spring Creek	19		1.1	
Johnson Prairie Creek	2	0.1		
<i>East Side <sup>3</sup></i>				
Pankey Spring Creek	60			0.7
Schnipps Valley Drainage	17	0.7		
Ben Hall Creek	12			2.1
Tillie Spring Drainage	20	1.1		
Miller Creek	60		6.7	
Wildhorse Creek	3		2.8	
Norcross Spring Drainage	5			0.6
Pitchlog Creek	40	2.7		
Barnes Valley Creek	50		5.4	
Long Branch Creek	30	1.5	0.1	
Willow Spring Creek	1			4.6
Antelope Creek	15		3.0	3.1
Rock Creek	100	0.8	1.2	
Holbrook Spring Drainage	5			2.0
East Branch Lost River	10		2.0	
Mills Creek	unknown			1.6

<sup>1</sup> These are approximate figures, using the best available data.<sup>2</sup> Condition obtained from results of stream surveys performed in 1980-82, and 1990.<sup>3</sup> Condition obtained from specialists' field observations. Inventory of east side riparian-wetland areas is needed.

floodplain, as supplied by trees in the riparian-wetland areas, provides terrestrial animal cover and food, dissipates water energy, traps sediment, increases water storage, changes flow patterns, and maintains and improves aquatic habitat conditions.

According to Campbell and Franklin (1979) and Franklin et al (1981), the greatest structural diversity in riparian-wetland areas is, in general, provided by old growth forest. Based on this conclusion and the knowledge of BLM biologists, a method of evaluating the condition of riparian-wetland areas was developed. The method uses average tree size, which can be derived from the Klamath Falls Resource Area's operations inventory database, as the indicator of riparian-wetland habitat condition. In western Oregon, riparian-wetland habitat with mature trees provides the greatest plant and structural diversity, with a high level of animal and woody debris diversity (Brown 1985). It is not appropriate for the Klamath Falls Resource Area to use the diameter (size) of conifers in the riparian-wetland areas as an indicator of its condition, because many riparian-wetland areas contain mostly herbaceous species rather than predominantly brush and conifers. Furthermore, the presence or absence of trees reflect conditions resulting predominantly from forestry practices; it does not allow for the representation of conditions resulting from grazing, which affects most of the riparian-wetland areas and therefore needs to be considered. Therefore, present riparian-wetland conditions were determined by two methods: for the west side, inventory data obtained from 1980 to 1982 and in 1990 by the BLM's Medford District was used, along with interdisciplinary input to account for changes

in riparian-wetland condition that may have occurred since then; for the east side, qualitative data, such as photos taken on regular time intervals at established points in riparian-wetland areas, and interdisciplinary input were used. A systematic re-inventory of west side riparian-wetland areas, as well as a quantitative initial inventory of east side riparian-wetland areas would provide more up-to-date information about riparian-wetland conditions.

Improvements in riparian-wetland condition have already been made in the planning area through the implementation of special protective measures and management prescriptions for BLM activities in riparian-wetland areas. Overall riparian-wetland conditions are fair to good, with some riparian-wetland ecosystems needing improvement. Table 3-18 lists riparian-wetland ecosystems that have been identified for potential restoration activities (see Figure 2-1). Historic and current overgrazing, road building, timber harvest, and adverse cumulative watershed impacts have caused damage to riparian-wetland ecosystems.

Monitoring riparian-wetland areas (see Table 3-19 for riparian-wetland locations) in the planning area has focused primarily on obtaining and maintaining a photographic record of riparian-wetland conditions using photo points. In addition, utilization cages ("mini-exlosures" used to compare ungrazed vegetation in the cage with grazed vegetation outside of it) have been set up to monitor livestock utilization of riparian-wetland vegetation and document regrowth of vegetation after livestock use.

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**Table 3-18. Riparian Systems Identified for Potential Restoration Activities.**

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<i>West Side</i>	<i>East Side</i>	
Spencer Creek	Ben Hall Creek	Rock Creek
Clover Creek	Pitchlog Creek	Mills Creek
Miners Creek	Barnes Valley Creek	Van Meter Flat
Klamath River	Long Branch Creek	Wildhorse Creek
Hayden Creek	Willow Spring Creek	Aspen Enclosure
Edge Creek	Holbrook Spring Drainage	Gerber Lakes
Long Prairie Creek	Antelope Creek	Gerber Dam Reservoir
Cold Creek	East Branch Lost River	Dog Hollow Reservoir
	Woolen Canyon	Upper Midway Reservoir
	Bear Valley Flat	

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With increased concern about riparian-wetland habitat, grazing management in the Klamath Falls Resource Area has changed significantly in the last ten years, particularly in the Gerber Block. Adjustments in the season of use and the development of new allotment management plans have occurred and will continue to support intensive grazing systems that improve riparian-wetland conditions. These systems use multi-pasture rotations with short-duration, high-intensity grazing, which allows vegetative regrowth and/or deferment grazing in of riparian-wetland areas.

## Wildlife

About 523 vertebrate wildlife species, including approximately 140 mammals, 331 birds, 31 reptiles, and 21 amphibians, occur within the planning area. Generally, populations of the various species on BLM-administered lands have not been inventoried, and

other than some special status species, numbers are unknown. Species that obtain at least one of their life requirements (breeding, feeding, or resting) within the various seral stages and special habitat features in the planning area are shown in Appendix 3-C in the draft. A description of several of these wildlife species is in the Analysis of the Management Situation, located in the Klamath Falls Resource Area office.

This document focuses on priority wildlife species, which includes both non-special-status species and special status species. This section covers priority species that do not have a special status but do have high economic or recreation value, such as game species and species with significant public interest. A list of these species is provided in Table 3-20 along with information on primary habitat and population levels. Wildlife species that have special status include federal listed or proposed threatened or endangered, federal candidate, state listed or proposed threatened or endangered, Bureau sensitive,

**Table 3-19. Riparian-Wetland Locations.**

Riparian-Wetland Name	Location	Acres
<i>West Side</i>		
Squaw Point	T. 37 S., R. 8 E., Sec. 17	40
Pederson	T. 38 S., R. 5 E., Sec. 18	15
Johnson Creek	T. 38 S., R. 5 E., Sec. 21	36
Buck Marsh	T. 38 S., R. 5 E., Sec. 23	74
Bear Wallow	T. 38 S., R. 5 E., Sec. 26	4
Kent Peak	T. 38 S., R. 5 E., Sec. 27	38
Johnson Creek 2	T. 38 S., R. 5 E., Sec. 28	11
Surveyor	T. 38 S., R. 5 E., Sec. 25	36
Buck Swamp	T. 38 S., R. 5 E., Sec. 25	27
Cherry Glades	T. 38 S., R. 5 E., Sec. 35	8
Saddle Spring	T. 38 S., R. 6 E., Sec. 9	5
Buck Swamp 2	T. 38 S., R. 6 E., Sec. 19	25
Clover Creek	T. 38 S., R. 6 E., Sec. 22	5
Spencer Creek	T. 38 S., R. 6 E., Sec. 27	8
Keno Access	T. 38 S., R. 6 E., Sec. 30	5
Long Lake	T. 38 S., R. 8 E., Secs. 19 & 30	300
Cold Creek	T. 39 S., R. 5 E., Sec. 3	23
Onion Spring	T. 39 S., R. 5 E., Sec. 13	10
Johnson Prairie	T. 39 S., R. 5 E., Sec. 17	28
Round Lake	T. 39 S., R. 7 E., Sec. 1	7
Smith Reservoir	T. 40 S., R. 5 E., Sec. 25	5
Bear Flat	T. 40 S., R. 6 E., Sec. 33	5
Hayden Creek	T. 41 S., R. 5 E., Sec. 1	10
Dixie Spring	T. 41 S., R. 5 E., Sec. 5	3
Edge Creek	T. 41 S., R. 5 E., Sec. 15	5
Wild Gal	T. 41 S., R. 5 E., Sec. 17	5

Table 3-19. Riparian-Wetland Locations (continued).

<i>East Side</i>		
Campbell Reservoir	T. 36 S., R. 15 E., Sec. 28	60
Horton Reservoir	T. 37 S., R. 11-1/2 E., Sec. 11	20
Ben Hall Creek	T. 38 S., R. 13 E., Secs. 34 & 35	40
Alkali Lake	T. 39 S., R. 11-1/2 E., Secs. 1, 2, 12 & 13	240
Gerber Potholes	T. 39 S., R. 13 E., Secs. 2 & 11	80
Pankey Lake	T. 39 S., R. 13 E., Secs. 7 & 18	60
DeVaul Lake	T. 39 S., R. 13 E., Sec. 10	10
Kent Meadow	T. 39 S., R. 13 E., Sec. 14	40
Schnipps Spring	T. 39 S., R. 13 E., Sec. 25	35
Tillie Spring	T. 39 S., R. 13 E., Sec. 25	20
Big Adobe Reservoir	T. 39 S., R. 13 E., Sec. 35	160
Longbranch Creek	T. 39 S., R. 14 E., Secs. 13 & 24	30
Round Valley Waterspreader	T. 39 S., R. 14 E., Secs. 19, 20, 21, 28, 29, 30, 32 & 33	1,100
Barnes Valley Creek	T. 39 S., R. 14 E., Secs. 21 to 24	60
Pitchlog Creek	T. 39 S., R. 14 E., Secs. 24 & 25	40
Round Valley Reservoir	T. 39 S., R. 14 E., Sec. 32	240
Aspen Enclosure	T. 40 S., R. 10 E., Sec. 11	10
Surprise Valley	T. 40 S., R. 10 E., Sec. 11	10
Van Meter Flat	T. 40 S., R. 11 E., Sec. 6	30
Captain Jack Lake	T. 40 S., R. 12 E., Sec. 24	40
Smith Reservoir	T. 40 S., R. 13 E., Secs. 7 & 18	120
Harpold Reservoir	T. 40 S., R. 13 E., Sec. 18	100
Loveness Waterhole	T. 40 S., R. 13 E., Sec. 19	30
Long Lake	T. 40 S., R. 13 E., Secs. 19 & 20	10
Warlow Meadow	T. 40 S., R. 13 E., Sec. 30	5
Fivemile Reservoir	T. 40 S., R. 13 E., Sec. 32	5
Dog Dam Reservoir	T. 40 S., R. 14 E., Sec. 1	10
4020 Reservoir	T. 40 S., R. 14 E., Sec. 2	5
Copeland Reservoir	T. 40 S., R. 14 E., Secs. 13 & 14	120
Randall Reservoir	T. 40 S., R. 14-1/2 E., Sec. 6	50
Dog Hollow Reservoir	T. 40 S., R. 14-1/2 E., Sec. 7	100
Dog Hollow Waterspreader	T. 40 S., R. 14-1/2 E., Secs. 7, 8, 17 & 18	350
Kness Reservoir	T. 40 S., R. 14-1/2 E., Sec. 8	40
Midway Reservoir	T. 40 S., R. 14-1/2 E., Sec. 10	10
Upper Midway Res.	T. 40 S., R. 14-1/2 E., Sec. 11	50
Section 21 Reservoir	T. 40 S., R. 14-1/2 E., Sec. 21	80
Gerber Dam Reservoir	T. 40 S., R. 14-1/2 E., Sec. 22	40
Bumpheads Reservoir	T. 40 S., R. 14-1/2 E., Sec. 31	120
Kilgore Reservoir	T. 40 S., R. 14-1/2 E., Sec. 34	30
Bear Valley Flat	T. 40 S., R. 15 E., Secs. 21, 28 & 29	100
E. Branch Lost River	T. 41 S., R. 14 E., Secs. 13, 23 & 24	20
Willow Valley Reservoir	T. 41 S., R. 14 E., Secs. 12 & 13 and T. 41 S., R. 14-1/2 E., Secs. 8, 17, 18 & 19	675
Antelope Reservoir	T. 41 S., R. 14-1/2 E., Sec. 2	110
Duncan Springs	T. 41 S., R. 14-1/2 E., Sec. 4	5
Antelope Creek	T. 41 S., R. 14-1/2 E., Secs. 4 & 5	40
Rock Creek	T. 41 S., R. 15 E., Secs. 3, 4, 8, 9 & 17	100
Gerber Reservoir	See Map 3-3	20

and Bureau assessment species, and are dealt with in the Special Status Species section.

Each of the priority species requires a specific set of habitat conditions. These conditions may be found within one or many of the plant communities and seral stages in the planning area. For example, osprey are found primarily in riparian zones and upland forests

with snags, whereas black bears are found in six habitat types. Map 3-5 in the map packet shows wildlife habitat in the planning area.

As explained in the Vegetation section, a variety of seral stages ranging from early seral stage to old growth can occur in each major plant group. Seral stage diversity is generally correlated with wildlife

**Table 3-20. Priority Animal Species.<sup>1</sup>**

Species	Reason For Listing <sup>2</sup>	Primary Habitat <sup>3</sup>	Population Level/Trend <sup>4</sup>
Rocky Mountain Elk	Game	a,b,c,d,e,f	Low/Increasing
Roosevelt Elk	Game	a,b,c,d,e,f	Low/Increasing
Mule Deer	Game	a,b,c,d,e,f	High/Stable
Black-tailed Deer	Game	a,b,c,d	High/Stable
Antelope	Game	a,b	Moderate/Stable
Black Bear	Game	a,b,c,d,e,f	Moderate/Decreasing
Mountain Lion	Game	a,b,d,f,g	Low/Stable
Furbearers	Game	a,b,c,d,e,f,g,i,j	Moderate/Stable
Osprey	HI	f,h	Moderate/Increasing
Accipiters <sup>5</sup>	HI	c,d,e,f,k	Unknown
Prairie Falcon	HI	a,b,c,d,e,f	Moderate/Stable
Red Tailed Hawk	HI	a,b,c,c,e,f,g	Moderate/Stable
Dominant Woodpeckers <sup>6</sup>	HI	a,d,e,f,h,j	Low/Decreasing
Sandhill Crane	HI	f	Moderate/Stable
Wild Turkey	Game	a,b,i	Moderate/Increasing
Upland Gamebirds <sup>7</sup>	Game	a,b,d,e,f	Moderate/Stable
Waterfowl <sup>8</sup>	Game	f	Moderate/Decreasing
Reptiles/Amphibians	HI	a,b,c,d,e,f,g,j,k	Unknown

<sup>1</sup> Does not include special status or Supplemental Environmental Impact Statement Special Attention species.

<sup>2</sup> HI = High public interest and concern.

<sup>3</sup> Primary habitat includes breeding, feeding, or resting sites within the following seral stages and special habitats (after Brown 1985):

- a = early seral
- b = mid seral
- c = late seral
- d = mature
- e = old growth
- f = riparian
- g = talus slope/cliff
- h = snags
- i = hardwoods
- j = dead and down

<sup>4</sup> Determined by resource area biologist based on field observations and consultation with other agencies. Population levels of many wildlife species are difficult to determine and therefore must be considered estimates only.

<sup>5</sup> Includes sharp-shinned hawk and Cooper's hawk.

<sup>6</sup> Includes hairy, downy, pileated, red breasted sapsucker, and northern flicker.

<sup>7</sup> Includes mountain and valley quail, chukar, and blue grouse.

<sup>8</sup> Includes nesting ducks and geese.



diversity (that is, the greater the number of different seral stages and associated edges in an area, the greater the number of wildlife species) (Brown 1985). Seral stages are always changing, progressing toward their climax stage. Plant groups progress toward a climax seral stage as determined by yearly precipitation, soils, and management actions. Natural or human-related disturbances, such as fire, logging, or grazing, can either maintain a particular seral stage or set succession back to an earlier stage. As a result, wildlife species requiring older seral stages are replaced by species adapted to younger seral stages. For example, clearcutting old growth and mature coniferous forests eliminates preferred habitat for species such as the northern spotted owl and northern flying squirrel while creating habitat for species such as the creeping vole and white-crowned sparrow.

According to Brown (1985) and Thomas (1979), approximately 80 wildlife species on the west side and 149 species on the east side find their primary habitat within old growth. In the opinions of resource area wildlife biologists and other wildlife professionals, the reduction of mature and old growth forest stages represents the most serious problem for wildlife. Under the current BLM timber management plan, older forest habitat is being harvested, mainly by partial cuts, at the rate of approximately 600 acres per year, while on private lands, most older forest has been eliminated. The loss of older forest has deprived some priority species of important habitat components. For example, optimal cover for Roosevelt elk in western Oregon has declined as a result of the reduction of older forest. Nesting areas for northern goshawks (an accipiter), pileated woodpeckers (one of the dominant woodpeckers), and great blue herons, and prey-stalking areas for mountain lion (Harcombe 1976) have likewise declined.

Early, mid, and late seral stage conifer forests comprise the dominant habitat on BLM-administered lands. Approximately 104 wildlife species on the west side and 263 species on the east side find their primary habitat within these stages. Hardships to wildlife associated with these habitats are related more to quality, such as stand characteristics, landscape patterns, extent of road construction, than to quantity of habitat. Inadequate interspersions of cover and forage and excessive road construction have adversely affected big game populations (Brown 1985). Adjacent private lands contribute forage but little optimal cover. Past timber harvest activities and high road densities have reduced habitat quality for deer and elk, which are found throughout the planning area (Klamath Falls Resource Area wildlife inventory files). Likewise,

commercial thinning of young stands reduces dense nesting habitat required by accipiters (Reynolds 1983). The complexity in vertical and horizontal vegetation structure is reduced when intensive forest management practices such as short harvest rotation, thinning, and slash burning occur, resulting in long-term habitat problems associated with early to late seral stages.

Other habitats besides the conifer forest seral stages described above have been impacted by forest management. These habitat components include snags; dead and down wood; riparian areas; special habitat features, such as cliffs (25 miles), talus slopes (590 acres), and wetlands and wet meadows (5,400 acres; also see Table 3-19); and dryland hardwoods (4,000 acres, including west side).

Snags are of special concern because they provide primary habitat for approximately 39 species of birds and mammals on the west side and 62 species on the east side. Dominant woodpeckers, a priority species group, use snags as primary habitat. Cavity-nesting birds (including woodpeckers and secondary cavity users) feed on insects and play an important role in the control of forest insect pests (Brown 1985). Under natural conditions, snags occur throughout the forest when trees die from natural suppression, fire, insects, and disease. However, logging and current safety and fire prevention measures have resulted in the elimination of most snags in the planning area. Current populations of the five dominant woodpeckers (hairy, downy, pileated, red-breasted sapsucker, and northern flicker) are estimated by resource area biologists at approximately 40 percent of potential, which is the current management objective. Six species of cavity users (house wren, Bewick's wren, violet-green swallow, tree swallow, mountain bluebird, and western bluebird) prefer early seral stages resulting from timber harvesting. Although wildlife trees have not been inventoried during the past decade, snags or green tree replacements on harvested acres have been left at the rate of 3 trees per acre on the east side and 1.2 trees per acre on the west side. Some of the wildlife trees are small diameter (less than 15 inches) snags or live trees and some are soft snags, which do not provide snag habitat for the future.

Recent concerns have been expressed over wildlife species requiring large, dead and down wood on the forest floor (Maser and Trappe 1984; Maser et al. 1988). Approximately 56 wildlife species on the west side and 138 species on the east side find their primary habitat in dead and down wood. Intensive forest management practices such as short harvest rotations

(80 years or less), slash burning, and thinning have reduced the amount of this habitat (Maser and Trappe 1984).

Riparian zones are also of special concern (see the Riparian-Wetland Areas section). Approximately 172 species of wildlife on the west side and 230 species on the east side find their primary habitat in these areas. Timber harvesting on BLM-administered lands has changed riparian habitat on many first and second order headwater streams. Amphibians, such as the Olympic salamander and tailed frog, depend on cool, clear water found in these streams. Ospreys and great blue herons, which often nest in riparian habitat, have also been affected by modification of riparian vegetation including, in some cases, the removal of all nest and roost trees within riparian areas.

Special habitats, such as cliffs, talus slopes, wet meadows, wooded swamps, and bogs, provide elements of forest diversity important to many wildlife species. Black bears and Roosevelt elk use wet meadows as forage and resting areas, and mountain lions use cliffs and other rocky areas as hunting, denning, and resting areas (Harcombe 1976). Timber harvest activities, including road construction and yarding, and other activities, such as quarry development, off-highway vehicle use, and communication site developments, have removed cover and created disturbances in many special habitats, making them less valuable as habitat.

Hardwoods provide primary habitat for roughly 119 wildlife species on the east side and 100 on the west side. Because of their lower economic value in comparison to conifers and the relatively small number of hardwood stands in the planning area, this plant group does not receive intensive management. The majority of hardwood areas on the west side are oaks, producing mast crops as a primary food source for many wildlife species, including deer, wild turkeys, woodpeckers, and gray squirrels. Aspen is the primary hardwood species on the east side, providing important habitat for blue and ruffed grouse, woodpeckers, goshawks, deer, and many other species of wildlife.

## Fish

Streams, rivers, and other water bodies contain habitat for trout and other fish. These waters meet at least one of the life requirements (such as spawning, rearing, and passage) for the more than 50 species of non-salmonid fish and three species of trout (see Appendix P).

The potential of a stream to support fish is determined by the stream habitat's quality and condition, which are closely associated with conditions of the adjacent riparian zones (see Table 3-21). Altering riparian zones and stream channels can cause a downward trend in aquatic habitat conditions. In the past, the removal of conifer trees from riparian zones and adjacent upslope areas and road construction along streams have changed instream woody structure, water storage capability, channel stability and complexity, and suitable water temperatures, considerably reducing the potential productivity of most streams. Livestock grazing has also degraded aquatic habitat conditions by increasing sedimentation and streambank erosion. An improvement in riparian and channel conditions could increase wild salmonid production.

Within the planning area there are 37 miles of streams and rivers containing fish, and of these, 29 miles contain trout (see Map 3-6 in the map packet). Trout are also found in five lakes and reservoirs on or adjacent to BLM-administered land. Priority fish species include rainbow, brook, and red band trout, and Lost River and Shortnose suckers. (See the Special Status Species section for information on suckers). No anadromous salmonid fish species are found in the planning area.

## Special Status and Supplemental Environmental Impact Statement Special Attention Species Habitat

Species limited in abundance and distribution that have identifiable threats to their existence are considered to be special status species. The categories of special status plant and/or animal species are federal listed or proposed threatened or endangered, federal candidate, state listed or proposed threatened or endangered, state sensitive, Bureau sensitive, and BLM assessment species. For more information about Supplemental Environmental Impact Statement Special Attention Species see Appendix D.

## Special Status Plants

Presently there is one federally listed plant species in the Klamath Falls Resource Area. *Astragalus applegatei* is listed as endangered by the U.S. Fish and Wildlife Service. Although there are known populations within the planning area, none of these populations are on BLM-administered lands. Federally listed, federal candidate, state listed, Bureau sensitive, and Bureau assessment species known or suspected to occur on the resource area lands are displayed in Table 3-22. Inventory for special status plants is done predominantly in conjunction with clearances for timber sales, range improvement projects, or other soil and plant disturbing actions. Since 1980, approximately 17,000 acres of the planning area have been inventoried for special status plants.

## Supplemental Environmental Impact Statement Special Attention Plant Species

### Nonvascular Plants (Lichens and Bryophytes) and Fungi

Lichens, bryophytes (mosses, liverworts, and hornworts), and fungi are common throughout the Klamath Falls Resource Area. Previous surveys have identified some lichen, bryophyte, and fungi species that do occur. However, no specific efforts had been implemented to describe these resources in detail. For additional information on lichens, bryophytes, and fungi, refer to the Supplemental Environmental Impact Statement (pages 3- and 4-130 to 3- and 4-148).

**Table 3-21. Priority And Special Status Fish Habitat Conditions and Populations.<sup>1</sup>**

Priority Species	Stream Miles	Condition of Habitat (miles) <sup>2</sup>				Current Wild Population	
		Minimal	Fair	Good/Optimal	Trend <sup>3</sup>	Level	Trend <sup>3</sup>
Rainbow Trout (west side)	12.5	0	0	12.5	0	H	0
Rainbow Trout (east side)	13.5	0.5	7.0	6.0	0/+	H	0
Redband Trout (west side)	2.0	0	2.0	0	0	H	0
Redband Trout (east side)	2.5	0	2.5	0	0	L	-
Brook Trout	0.8	0	0.8	0	0	L	0
Lost River, Shortnose Sucker (west side)	11.0	0	0	11.0	0	M	-
Lost River, Shortnose Sucker (east side)	10.5	0	4.5	6.0	+	M	-

Sources: Stream inventories (150 miles) conducted by the Klamath Falls Resource Area fish biologist and by the Oregon Department of Fish and Wildlife; Western Oregon Digital Database; and a related factors analysis (that is, verification of tree size as an indicator of habitat condition) completed by the Klamath Falls Resource Area fish biologist.

<sup>1</sup> Habitat and population data are for streams on BLM lands only.

<sup>2</sup> See Appendix Q for methodology of rating stream habitat quality.

<sup>3</sup> + = increasing/improving; - = decreasing/declining; 0 = stable

<sup>4</sup> H = high M = medium L = low

Ratings are in relation to 10-year average population levels.

Table 3-22. Special Status Plant Species.

Botanical Plant Name	Common Plant Name	Status
<i>West Side</i>		
<i>Asarum wagneri</i>	Green-flowered wild ginger	BS
<i>Astragalus applegatei</i>	Applegate's milk-vetch	FE/SE
<i>Calochortus greenei</i>	Greene's mariposa lily	FC1/SC
<i>Collomia mazama</i>	Mt. Mazama collomia	FC2
<i>Limnanthes floccosa</i> spp. <i>bellingariana</i>	Bellinger's Meadow-foam	FC2/SC
<i>Mimulus pygmaeus</i>	Pygmy monkeyflower	FC2/SC
<i>Perideridia erythrorhiza</i>	Red-root yampah	FC2/SC
<i>Thelypodium brachycarpum</i>	Short-podded thelypody	AS
<i>East Side</i>		
<i>Astragalus applegatei</i>	Applegate's milk-vetch	FE/SE
<i>Astragalus peckii</i>	Peck's milk-vetch	FC2/SC
<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i>	Long-bearded mariposa lily	FC2/AS
<i>Castilleja chlorotica</i>	Green-tinged paintbrush	FC2/SC
<i>Penstemon glaucinus</i>	Blue-leaved penstemon	FC2/SC
<i>Rorippa columbiae</i>	Columbia cress	FC2/SC
<i>Silene nuda</i> spp. <i>insectivora</i>	Fringed campion	AS
<i>Thelypodium brachycarpum</i>	Short-podded thelypody	AS

Federal Listed by U.S. Fish and Wildlife Service and the National Marine Fisheries Service:

- FC1 = Federal candidate category 1
- FC2 = Federal candidate category 2
- FC3 = Federal category 3C species
- FE = Federally listed as endangered
- FP = Federal proposed

State Listed by the Oregon Department of Fish and Wildlife:

- SE = State endangered
- SC = State candidate

Bureau of Land Management Designations:

- BS = Bureau sensitive species
- AS = Bureau assessment species

## Vascular Plants

None of the Supplemental Environmental Impact Statement vascular plant species are documented as occurring on BLM-administered lands in the Klamath Falls Resource Area. However, the Klamath Falls Resource Area is within the range of *Cypripedium fasciculatum* and populations are likely to be found in the appropriate habitat. Additional information about this species is outlined in Appendix J2 of the Supplemental Environmental Impact Statement.

## Special Status Animals

Map 3-7 shows habitat areas for some special status animal species of the planning area. Table 3-23 shows the special status animal species that are known or suspected to occur in the planning area and their listing status. Following the table is a brief discussion of those species for which adequate information is available.

Some of the federal candidate and BLM assessment species are not documented on BLM-administered lands, but likely occur in or near the planning area. Examples of these species include: the tailed frog, flammulated owl, pallid bat, and fringed myotis bat. Very little is known of the range and abundance of listed invertebrates within the planning area; consequently their occurrence is poorly documented.

It is estimated that half of the planning area (west side) has been inventoried for northern spotted owls, although the level of inventory varies. A total of 20 northern spotted owl sites affect BLM-administered lands, with 18 considered active since 1985. Thirty-five owls have been captured and leg banded with U.S. Fish and Wildlife Service bands and BLM colored bands since 1986.

Research and monitoring of northern spotted owls in California, Oregon, and Washington indicate that the northern spotted owl is primarily associated with old growth and mature forest types (Barrows 1981; Barrows and Barrows 1978; Carey 1985; Forsman 1976, 1980, 1986; Forsman and Meslow 1985, 1986; Forsman et al. 1977, 1984, 1987; Garcia 1979; Gould 1977; Gutierrez 1985; Gutierrez et al. 1984; Marcot and Gardetto 1980; Meslow et al. 1986; Postovit 1977; Solis and Gutierrez 1982). Northern spotted owls commonly nest in cavities, 50 feet or more above the ground, in large, decadent old growth trees (Forsman et al. 1984, Gutierrez 1985). Other nest sites include large mistletoe clumps and platforms formed by whorls of large branches.

Table 3-23. Special Status Animal Species.

Species	Status
Lost River Sucker	FE/SE
Shortnose Sucker	FE/SE
Peregrine Falcon	FE/SE
Bald Eagle	FT/ST
Northern Spotted Owl	FT/ST
Klamath Largemouth Sucker	FC
Slender Sculpin	FC
Schuh's Homopteran Caddisfly	FC
Black Tern	FC
Mountain Quail	FC
California Wolverine	FC
North American Lynx	FC
Western Snowy Plover	FC/ST
Jenny Creek Sucker	FC/SS
Redband Trout	FC/SS
Cascade Frog	FC/SS
Spotted Frog	FC/SS
Northwestern Pond Turtle	FC/SS
Ferruginous Hawk	FC/SS
Northern Goshawk	FC/SS
Tricolored Blackbird	FC/SS
Western Sage Grouse	FC/SS
White-faced Ibis	FC/SS
Pacific Fisher	FC/SS
Townsend's Big-eared Bat	FC/SS
Greater Yellowlegs	AS
Merlin	AS
Foothill Yellow-legged Frog	AS/SS
Tailed Frog	AS/SS
Western Toad	AS/SS
California Mountain Kingsnake	AS/SS
Sharptail Snake	AS/SS
Acorn Woodpecker	AS/SS
Black-backed Woodpecker	AS/SS
Lewis' Woodpecker	AS/SS
Pileated Woodpecker	AS/SS
White-headed Woodpecker	AS/SS
Greater Sandhill Crane	AS/SS
Great Egret	AS/SS
Snowy Egret	AS/SS
Northern Pygmy Owl	AS/SS



Species	Status
Flammulated Owl	AS/SS
Great Gray Owl	AS/SS
Bank Swallow	AS/SS
Loggerhead Shrike	AS/SS
Purple Martin	AS/SS
Pygmy Nuthatch	AS/SS
Williamson's Sapsucker	AS/SS
Swainson's Hawk	AS/SS
Yellow Rail	AS/SS
Fringed Myotis Bat	AS/SS
Pallid Bat	AS/SS
Ringtail	AS/SS
Marten	AS/SS

FE = Federal Endangered

FT = Federal Threatened

FC = Federal Candidate (category 2)

AS = BLM Assessment

ST = State Threatened

SE = State Endangered

SS = State Sensitive

Northern spotted owls seldom forage in clearcuts or second growth stands younger than 60 years old, preferring old growth (Forsman et al. 1984, 1987; Solis 1983). Abundance of prey and habitat with structural features favorable for foraging are important factors in the owls' preference for old growth (Carey et al. 1986a, 1986b, Forsman et al. 1984, Raphael and Barrett 1984, and Raphael et al. 1986). Northern spotted owl habitat must be capable of supporting the bushy-tailed woodrat, red tree vole, flying squirrel, snowshoe hare, deer mouse, and western red-backed vole.

The northern spotted owls' preference for mature and old growth forest for roosting (Forsman 1980, Marcot and Gardetto 1980) may be in response to their needs for thermoregulation (Barrows 1981). Avoiding great horned owls, a major predator of northern spotted owls, may also be an important factor. Owls roost during the day in hardwood stands and second growth stands, generally near old growth stands.

Northern spotted owl selection of old growth habitat components in younger forests indicate that habitat structure, rather than age, may be an essential factor (Forsman 1976, 1986; Forsman et al. 1977, 1984; Garcia 1979; Meslow et al. 1986; Postovit 1977; and Vincent 1986). Even with these old growth compo-

nents, northern spotted owl densities in young growth are lower than in old growth (Forsman 1976, 1986; Forsman et al. 1977, 1984; Garcia 1979; Meslow et al. 1986; Postovit 1977; and Vincent 1986).

Published home range sizes of individual northern spotted owls vary from 600 acres to more than 19,000 acres (Allen and Brewer 1985; Allen et al. 1987; Brewer 1985; Forsman 1986, 1987; Forsman et al. 1984; Forsman and Meslow 1985; Meslow et al. 1986; Reid et al. 1987; Sisco and Gutierrez 1984; and Solis 1983). Little is known about the factors that influence home range selection and size, although habitat quality, fragmentation, and structure probably play a major role (Carey 1985, Dawson et al. 1986, Forsman et al. 1984, Forsman and Meslow 1986, and Gutierrez 1985). It also appears that northern spotted owls in Washington and northern Oregon generally have larger home ranges than in southern Oregon and northern California.

There are seven known bald eagle sites on BLM-administered lands in the planning area. Since 1986 a maximum of five of these nest sites have been occupied at any one time. The Pacific Bald Eagle Recovery Plan, prepared by the U.S. Fish and Wildlife Service in 1986, is currently being implemented by the cooperating agencies, including the BLM.

Bald eagles in the Pacific Northwest nest primarily in ponderosa pine, mixed conifer, Douglas fir, and sitka spruce/western hemlock forest types, selecting large old growth trees (Anthony et al. 1982). Some nesting occurs along large river systems where black cottonwood is the selected tree species. Anthony and Isaacs (1988) indicated that most nests (84 percent) are located within one mile of large bodies of water such as lakes, reservoirs, and large rivers. Nest trees were found to be the larger, dominant or codominant trees in the stand and were usually components of old growth or old age second growth forest (Anthony and Isaacs 1988). These authors' information indicated that bald eagles were using trees for nesting that were larger and older than those produced under 80- to 100-year timber rotation systems. The nest trees selected usually had an open view of the area, a clear flight path to and from the tree, and suitable perch trees nearby.

Anthony et al. (1982) described communal night roost characteristics in the mixed conifer and Douglas fir types. In both cases, the actual roost trees were larger than those in the surrounding forest. In specific studies, Stalmaster (1981) and Keister (1981) showed the existence of more favorable micro-climates in communal roost areas than in adjacent forest stands, thereby aiding in energy conservation by the birds.



### Chapter 3 - Affected Environment

Bald eagles feed primarily on fish during the spring and summer, but may shift to waterfowl and carrion during the winter. Several hundred bald eagles winter in the Klamath Basin, and often forage on BLM-administered lands.

The U.S. Fish and Wildlife Service prepared a Pacific Coast Recovery Plan for the **peregrine falcon** in 1982. This plan is being implemented on BLM-administered lands.

The peregrine falcon is a cliff-nesting species preferring tall cliffs located near water, with ledges, potholes, or small caves suitable for scraping out a nest (U.S. Fish and Wildlife Service 1982). Areas frequented by shorebirds, pigeons, and waterfowl provide ideal feeding areas for peregrines.

Occasional sightings of peregrines are made in the winter, but these are thought to be migrant birds, as no active peregrine nests have been identified during examination of potential peregrine habitat. There is one known historic peregrine nest site in the planning area. The Oregon Department of Fish and Wildlife plans to reintroduce peregrines at this site sometime in the near future.

The **western sage grouse**, a federal candidate species, is found on the east side. The 1970 sage grouse population in Klamath County was estimated at 320 birds (Ingram and Fortune 1978). The Oregon Department of Fish and Wildlife has stated that reported sage grouse sightings have declined since 1970, possibly indicating a decline in population numbers or a change in distribution. Crawford (1982) documented a 68 percent decline in Oregon's sage grouse population from 1952 to 1982. Klamath County is on the western edge of sage grouse distribution in Oregon and it is believed that grouse numbers have always been relatively low in the county (Oregon Department of Fish and Wildlife 1987a). Because the sage grouse population has not been systematically monitored, it is unknown whether the Klamath County population is following the trend reported by Crawford in 1982.

Sage grouse depend on sagebrush-grassland communities. Big sage (*Artemisia tridentata*), the primary species grouse are dependant upon in Klamath County, is usually associated with western juniper, although juniper is not a necessary habitat component. A variety of sage stand conditions are necessary for good grouse habitat. In general, good habitat should contain openings less than 300 yards in circumference, some

dense stands, and about equal amounts of tall and short sagebrush plants.

Lek sites (sage grouse mating grounds) are usually small, open areas from 0.01 to 10 acres with low, sparse sagebrush or are denuded of vegetation. Grassy swales, natural and irrigated meadows where grass has been removed, burned areas, cultivated fields adjacent to sagebrush-grass range lands, and dry lakebeds are often used as leks if there is water nearby. Broods need good cover, using stands of light to moderate density sagebrush. Young birds feed primarily on insects and shift to succulent forbs and shrubs.

The **Townsend's big-eared bat** is a federal candidate species. The only known location of the bat in the planning area is a maternity colony in the Klamath River Canyon discovered in 1988 by a resource area biologist. Prior to the discovery of the maternity colony, inventories in Klamath County were limited to those by Cross (1977), which revealed no evidence of the bat. The BLM is studying the bat population and site in cooperation with Southern Oregon State College and the Oregon Department of Fish and Wildlife. Cross (1977) found nine roosts used in daylight with 600 bats in southern Oregon, and three nursery colonies in southwest Oregon (Curry, Josephine, and Jackson counties). The population of Townsend's big-eared bats wintering in western Oregon seems particularly depleted (Perkins 1987).

Perkins (1987) stated that caves and cave-like structures are critical habitat for the big-eared bat, both as hibernacula in the winter and as roosts for summer nursery colonies. The bats also use abandoned mine tunnels and buildings, apparently requiring habitats that are free of human disturbance. These bats rely entirely on insects and arthropods as a food source (Perkins 1987).

The **shortnose** and **Lost River suckers** were listed as endangered species in 1988 under the Endangered Species Act. Both species inhabit lakes and streams in the Klamath River Basin. They were once abundant in the Lost River watershed, upper Klamath Lake, and its tributaries. Both species have declined rapidly in recent years.

On the west side reproducing populations of shortnose and Lost River suckers are known to occur in Copco Reservoir, which is in California five miles downstream from the Oregon-California state line on the Klamath River (City of Klamath Falls 1986). The shortnose

sucker spawns in the upper Klamath River above Copco Reservoir; and small numbers of Lost River suckers have also been found approximately 20 miles upstream from the Copco Reservoir in the reservoir above the J.C. Boyle Dam. The **Klamath largescale sucker** has been found in the upper Klamath River and Copco Reservoir. On the east side, the Lost River and shortnose suckers occurred historically in the Lost River system (see Map 3-6). The shortnose sucker has been confirmed in Gerber Reservoir and also spawns in the two primary tributaries of the reservoir. The Klamath largescale sucker is found in Gerber Reservoir and its tributaries.

All three sucker species normally inhabit lakes or slow moving sections of streams and rivers. Relatively clean gravel or rubble in fast moving sections of a stream are required for successful spawning of these species, although shoreline habitat of lakes or reservoirs is also used. The general pattern for the shortnose, Lost River, and Klamath largescale suckers is to migrate from lakes into tributaries to spawn in the spring and later return to lake habitat. Shortly after hatching, the larval suckers drift with the current to a downstream lake, reservoir, or slackwater area to grow.

Agricultural water diversions, timber harvest, and unregulated livestock grazing in riparian zones has degraded sucker habitat and contributed to their decline. Researchers continue to study the population decline of the shortnose and Lost River suckers in the upper Klamath River Basin, especially in relation to Upper Klamath Lake's problem with excessively high nutrient content.

The **Jenny Creek sucker**, a dwarf form of the Klamath small scale sucker, is limited in distribution to the Jenny Creek subbasin of the Klamath River in the southwestern portion of the planning area (Hohler 1981). The U.S. Fish and Wildlife Service classifies it as a candidate for possible listing as a threatened and endangered species (U.S. Department of the Interior 1989). This is the only known dwarf sucker in the Pacific Northwest and possibly the only true dwarf representative of the larger species west of the Rocky Mountains. The Jenny Creek population of the Klamath small scale sucker may be described as a separate subspecies. The Oregon Department of Fish and Wildlife has classified the species as "sensitive" in recognition of its restricted distribution and high susceptibility to adverse environmental change (Oregon Department of Fish and Wildlife 1990).

The species inhabits about 29 miles of Jenny Creek and its tributaries and includes Johnson Creek, a portion of which occurs in the planning area. The Medford District administers the majority of the Jenny Creek watershed that occurs on BLM ownership.

Although the Jenny Creek sucker utilizes all habitat types, it prefers low gradient, partially shaded stream segments with relatively silt-free cobble/rubble substrate. Diverse, structurally complex riparian habitat is as important to this species as it is for the stream's rainbow trout population.

Effective hiding cover (such as large woody debris, undercut streambanks, and high water quality) are required for rearing, spawning, and food production. Aquatic insects such as water penny, stonefly mayfly, and caddisfly, which occur primarily in clean riffle habitat, comprise a major portion of the sucker's diet.

The **western pond turtle** is a candidate for listing as a federally threatened or endangered species. This aquatic turtle is found in lakes, ponds, and along larger streams throughout the planning area. Populations appear to be declining rapidly and there is little evidence of successful reproduction. Currently in the Klamath Falls Resource Area there are inventories and a long term population study of pond turtles.

## **Supplemental Environmental Impact Statement Special Attention Animal Species**

There are no documented occurrences of Supplemental Environmental Impact Statement Special Attention Animal Species on BLM-administered lands in the Klamath Falls Resource Area. For more information regarding the Supplemental Environmental Impact Statement Special Attention Animal Species see Appendix D. There are several Supplemental Environmental Impact Statement protection buffer animal species suspected or documented on BLM-administered lands in the Klamath Falls Resource Area. (see Appendix E).

## Special Areas

Special areas include areas of critical environmental concern and other land allocations with labels, such as environmental education areas and research natural areas. Currently, there are none of these special areas established in the planning area.

During the Resource Management Plan process, 13 candidate areas of critical environmental concern were identified and screened for eligibility for further consideration (see Appendix H for a description of the screening process and results and see "Potential Area of Critical Environmental Concern" in the glossary for a definition of relevance and importance criteria). As a result, nine areas are being considered for possible area of critical environmental concern designation and management. The decision to designate any or all of the potential areas of critical environmental concern will be included in the record of decision, following completion of the Resource Management Plan/Environmental Impact Statement. Several potential special areas were identified for intensified management other than through area of critical environmental concern designation (for example, land use allocations to protect scenic values). The potential special areas are briefly described in Table 3-24 and are shown on Map 3-8. The present condition of each area is described in Appendix H.

## Cultural Resources

Cultural resources include prehistoric and historic resources, and Native American traditional use areas. Prehistoric resources are the remains of Native American occupation before contact with non-native people (about 1830 for the Klamath Basin). Historic resources are the remains of occupation of both native and non-native people after contact. Traditional use areas are geographic locations with cultural or religious importance to contemporary Native American groups.

Through a group of laws beginning with the Antiquities Act of 1906, and including the Archaeological Resources Protection Act of 1979 (see Appendix A), the BLM has been mandated to protect and manage cultural resources on its lands. To meet this mandate the BLM conducts surveys for cultural resources prior to authorizing surface disturbing activities or approving land disposal or exchange (see Appendix R). Cultural resources are evaluated and protected as appropriate to the significance of the resource, usually through

avoidance of the area. Consultation with the State Historic Preservation Office occurs when cultural resources are identified.

The proper management of cultural resource sites requires a complete understanding of the form and significance of the resources. To achieve this understanding the BLM has actively encouraged research by qualified archaeologists. The University of Oregon conducted field schools in the Gerber Reservoir area for three seasons beginning in 1986. This work included a series of test excavations at stone ring village sites, an extensive inventory of the area, and publication of several reports. Also, Pomona College has held its archaeology field school in the Klamath Canyon since 1992. A contract to consolidate and integrate data from many years of research in the upper Klamath River Canyon was initiated by the BLM in 1989. The resulting report presents a comprehensive overview of the prehistoric use of the canyon (Mack 1989).

The Klamath Basin is the traditional home of the Klamath and Modoc tribes. Parts of the Basin were also used by the Yahooksin Band of the Snake Indians, Shasta, Achomawi Pit River, and Takelma peoples. The native population in 1860 was estimated to be 2,000 (Dicken and Dicken 1985). Before contact with European diseases the population was probably at least twice this figure. The Klamaths lived in relatively large, sedentary villages near Klamath Marsh, Williamson River, Upper Klamath Lake, and Link River, and used the uplands in the warm months as part of their seasonal round, rather than for long-term residence. The Modocs lived in semi-permanent winter villages along Lost River, Lower Klamath Lake, and Tulelake, and spent the warm months in summer villages in the uplands. Both the Klamath and the Modoc people relied heavily on the resources of the lakes, marshes, and rivers (Ray 1963). These resources include tule, cattail, wocus (water lily), fish, mollusk, and waterfowl. These were supplemented by upland plants such as camas and ipos, and by large game mammals. The occasional discovery of paleo-Indian projectile points in the Basin indicates that native occupation of the Basin may date to as early as 11,500 years ago. Evidence of more substantial occupation is dated to around 5500 BC at two sites on Lower Klamath Lake (Cressman 1940).

Prehistoric site types found in the area include stone ring and pit house villages, burials, quarries, stone scatters, bedrock mortars, rockshelters, and petroglyphs. The wide variety of known sites demonstrates extensive prehistoric use of many parts of the planning area. The Klamath Falls Resource Area manages more than 150 recorded prehistoric sites.

Table 3-24. Potential Special Areas.

Site Name	Size (acres)	Description	Primary Resource Values
Miller Creek Potential ACEC <sup>1</sup>	2,000	Deep, narrow riverine canyon in arid plateau region, in an essentially natural condition.	Scenic, wildlife, and natural processes.
Pacific Crest Trail Potential ACEC <sup>2</sup>	620	BLM portion of National Scenic Trail located in Klamath County, in close proximity to the Old Baldy area.	Natural process, scenic.
Old Baldy Proposed Research Natural Area/ACEC <sup>3</sup>	520	High elevation mixed conifer forests and associated brush fields not represented elsewhere in the Research Natural Area System.	Natural processes, or system, educational.
Upper Klamath River Potential ACEC	5,700	11 miles of the Klamath River Canyon from rim to rim extending from J.C. Boyle Powerhouse to the Oregon-California state line.	Historic, cultural, scenic, fisheries, wildlife population and habitat.
Yainax Butte Potential ACEC	720	Isolated mountain eight miles south of the town of Beatty, Oregon.	Natural systems.
Alkali Lake	240	Wetland area in Yonna Valley, between Dairy and Bonanza, Oregon.	Wildlife habitat.
Spencer Creek Potential ACEC	320	High gradient stream flows from Buck Lake to the Klamath River.	Fisheries.
Tunnel Creek Wetlands Potential ACEC	280	Lodgepole pine swamp located between Keno Road and Buck Lake.	Natural systems.
Bumpheads Potential ACEC	50	Two volcanic formations at the south end of the Gerber Block.	Scenic, natural systems.
Clover Creek Forest Educational Area	30	A small tributary to Spencer Creek used by elementary classes for educational purposes.	Educational.
Surveyor Forest Potential ACEC	150	Unlogged, mature mixed conifer forest with meadows along the headwaters of Johnson Creek. Adjacent to Surveyor campground.	Educational, natural processes or system, scenic, wildlife habitat.

<sup>1</sup> ACEC = Area of Critical Environmental Concern

<sup>2</sup> The majority (approximately 12,000 acres) of the Pacific Crest Trail potential Area of Critical Environmental Concern is within the BLM Medford District planning area.

<sup>3</sup> A portion of the Old Baldy proposed Research Natural Area/Area of Critical Environmental Concern is contained within the Pacific Crest Trail potential Area of Critical Environmental Concern (approximately 150 acre overlap). In addition, 160 acres of the Old Baldy Research Natural Area are within the BLM Medford District planning area.

Source: Western Oregon Digital Database and resource area special areas files



Non-native people began entering the Basin as early as the 1820s and by the late 1800s their population surpassed that of the native people. The first Europeans to enter the Basin were members of Peter Skene Ogden's trapping expedition in 1826 for the Hudson Bay Company. Trapping did not prove profitable, but by the 1860s the potential for agriculture, livestock, and logging in the basin was recognized. In 1864 a treaty was signed between the United States Government and the Klamath, Modoc, and Yahooskin Band of the Snake Indians which restricted the Native Americans to reservation lands and opened the rest of the Basin to homesteading. The immigrant population increased steadily through the turn of the century but was limited by the difficulty in exporting agricultural and timber products out of the Basin. In 1906 a railroad between Klamath Falls and Weed, California was completed and made the transportation of goods easier. It was not until 1926, with the opening of a line between Klamath Falls and Eugene, that the Klamath Basin was effectively connected to the rest of Oregon.

Historic site types include homesteads, roads, irrigation projects, Civilian Conservation Corps constructions, logging camps, corrals, and a schoolhouse, reflecting the importance of the agriculture, livestock, and timber industries in the basin. The Klamath Falls Resource Area manages five recorded historic sites.

Seven Native American (Klamath, Modoc, or Shasta) traditional use areas have been identified.

modifications that compose the scenery of BLM-administered lands. BLM-administered lands have been inventoried, evaluated, and assigned inventory classes according to their relative worth from a visual resource management point of view in order to consider visual resource (scenic) values during management planning activities. The BLM has established four visual resource inventory classes. Objectives for each class prescribe management activities that will maintain, enhance, or preserve scenic values (see the Visual Resources section under Management Direction Common to all Alternatives in Chapter 2 for a description of the four classes). Visual resource management inventory data is shown in Table 3-25 and on Map 3-9.

Approximately 60 percent of the planning area has fragmented land ownership patterns with non-BLM lands dominating the landscape. Areas seen from most county roads, such as East Langell Valley Road, in rural residential areas, are Visual Resource Management Class III. Areas seen from many logging access roads and other seldom seen areas are Visual Resource Management Class IV.

## Wild and Scenic Rivers

There are no federally designated wild, scenic, or recreational rivers in the planning area. Under section 5(d) of the National Wild and Scenic Rivers Act, federal agencies are required to consider all potential wild, scenic, or recreational rivers in land use plans. The Nationwide Rivers Inventory identifies some of these potentially eligible river segments. The only river segment

## Visual Resources

Visual resources are the land, water, vegetation, structures, and other natural features or cultural

Table 3-25. Visual Resources Inventory of BLM-Administered Lands.

Inventory Class	Acres	Percentage of the Land Base	Representative Areas
I	0	0	None in the Klamath Falls Resource Area.
II	34,000	16	Klamath River Canyon, Gerber Recreation Site, Klamath Forest Estates.
III	81,500	39	Hamaker Mountain, Spencer Creek, Willow Valley, Poe Valley, Highway 66.
IV	96,500	45	Gerber Plateau, Yainax Butte, Buck Lake, Dixie Townsite

identified in the Nationwide Rivers Inventory as potentially eligible is the upper Klamath River. The same stretch of the upper Klamath River (from the John C. Boyle Powerhouse to the Oregon-California state line, referred to by the BLM as Segment 2) is a state scenic waterway, known as the Klamath Scenic Waterway, which the BLM manages in cooperation with both the Oregon Department of Parks and Recreation and Pacific Power and Light.

Additional information indicates that eight other potentially eligible river segments flow through the planning area. During the resource management plan/environmental impact statement process, the BLM applied eligibility and classification criteria established

in U.S. Department of the Interior - Department of Agriculture guidelines to each of these river segments. Table 3-26 shows the status of eligibility determinations for these river segments and Appendix I provides the results of the eligibility studies.

Although six river segments (as well as part of the upper Klamath River in California) met the eligibility criteria for designation and are eligible for suitability study based on their free-flowing character and outstandingly remarkable values (see Map 3-10), only the upper Klamath River was found to be suitable in the Klamath Falls Resource Area draft Resource Management Plan/Environmental Impact Statement. Both segments of the upper Klamath River (segment 2 is the

**Table 3-26. Possible Wild, Scenic, and Recreational Rivers.**

River Name	Eligibility <sup>1</sup>	Potential Classification	ORVs	Total Miles	Percent BLM
Antelope Creek (seg. A)	Yes	Scenic	P	5.4	75
Antelope Creek (seg. B)	No <sup>2</sup>	N/A	N/A	0.5	100
Antelope Creek (seg. C)	Yes	Scenic	P	2.7	100
Barnes Valley Creek	Yes	Scenic	F,S	5.6	93
East Branch Lost River	No <sup>3</sup>	N/A	None	2.0	100
Miller Creek	Yes	Scenic	S	6.5	100
Rock Creek	No <sup>3</sup>	N/A	None	3.0	84
Spencer Creek	Yes	Scenic	F,S	3.0	43
Upper Klamath River (Oregon) (seg. 1)	No <sup>2</sup>	N/A	F,R	4.2	70
Upper Klamath River (Oregon) (seg. 2)	Yes	Scenic	H,P,R, F,S,T,W	11.0	75
Upper Klamath River (California) (seg. 3)	Yes	Scenic	F,R,W, H,S	5.3	11

<sup>1</sup> A river segment is eligible for inclusion in the National Wild and Scenic Rivers System if it is free-flowing and has one or more outstandingly remarkable values.

<sup>2</sup> Not eligible because not free-flowing.

<sup>3</sup> Not eligible because no outstandingly remarkable values.

Abbreviations used in this table:

ORV = Outstandingly remarkable values

F = Fish

P = Prehistoric

S = Scenic

W = Wildlife

H = Historic

R = Recreational

T = Native American traditional use

N/A = Not applicable



11-mile segment in the planning area and segment 3 is the adjacent 5.3-mile segment in California) were previously found to be suitable for inclusion in the National Wild and Scenic Rivers System in the *Final Eligibility and Suitability Report for the Upper Klamath Wild and Scenic River Study* (BLM 1990). Management alternatives and a proposed action for the 5.3-mile segment were addressed in the Redding, California BLM Resource Management Plan/Environmental Impact Statement process.

In April 1993, Oregon's Governor petitioned the Secretary of the Interior to designate the Oregon portion of the upper Klamath River through section 2a(1) of the National Wild and Scenic Rivers Act. In accordance with Departmental Manual NPS-12, the National Park Service prepared a draft Environmental Assessment on designation of the river. The Draft went out for public comment, then a Final was prepared based on those comments.

## Wilderness

Following the requirements of the Wilderness Act of 1964 and the Federal Land Policy and Management Act of 1976, the Medford District identified and inventoried one public land area having wilderness characteristics and values within the west side of the Klamath Falls Resource Area. The Mountain Lakes Wilderness Study Area, containing 334 acres, is being considered for designation as wilderness. No public land areas having wilderness characteristics were identified during the inventory conducted by the Lakeview District for the east side of the Klamath Falls Resource Area.

A separate final BLM Oregon Wilderness Environmental Impact Statement was completed in December 1989, along with the Oregon Wilderness Study Report completed in October 1991. In these documents, the Mountain Lakes Wilderness Study Area was recommended for wilderness designation as an addition to the existing Mountain Lakes Wilderness. In July 1992 the President recommended to Congress that the Mountain Lakes Wilderness Study Area be designated as wilderness, and added to the existing Mountain Lakes wilderness area.

## Recreation

The major recreation activities occurring on BLM-administered land in the planning area are camping, picnicking, whitewater rafting, hiking, horseback riding,

winter sports (snowmobiling, cross country and downhill skiing), general sightseeing (driving for pleasure, viewing scenery, wildlife observation), hunting, fishing, and driving recreational vehicles on and off roads. Some of this activity is concentrated in developed recreation sites, but most is dispersed recreation activity on roads, streams, rivers, and undeveloped forest lands.

Based on planning guidance established in November 1986, all BLM-administered land is categorized into two distinct recreation management areas — special recreation management areas and extensive recreation management areas. Although these categories were not used in the Lost River or Jackson-Klamath Management Framework Plans, they are an integral part of the inventory for this Resource Management Plan/Environmental Impact Statement. Typically, special recreation management areas are sites or areas requiring substantial recreation investment and/or more intensive recreation management. High-use recreation sites, wilderness areas, wild and scenic rivers, and large areas with high recreation values or opportunities are the types of areas established as special recreation management areas. Potential special recreation management areas in the Klamath Falls Resource Area are described in Table 3-27 and are shown on Map 3-11 (Table 3-28 is the key for Map 3-11). The Klamath Falls Resource Area's existing special recreation management areas are the Klamath River Complex (7,400 acres and 17,000 visits) and the Pacific Crest National Scenic Trail (40 acres and 10,000 visits). All BLM-administered lands outside special recreation management areas are considered extensive recreation management areas, which is where the majority of 1990 recreation visitation occurred. The Lakeview District has two extensive recreation management areas - the Lakeview Resource Area and the Klamath Falls Resource Area (206,000 acres and 250,000 visits).

The Klamath Falls Resource Area has four developed and eleven semi-developed recreation sites, three miles of developed hiking/horseback riding trails, 5 miles of designated snowmobile trails, 21 miles of stream supporting fishable populations of trout, approximately 117,000 acres that are legally accessible to the public, and 433 miles of BLM-controlled roads open to motorized travel.

The nomination and management of National Back Country Byways is a recently-initiated BLM program. The purpose of this program is to identify and publicize scenic driving opportunities on less-traveled roads

**Table 3-27. Potential Special Recreation Management Areas.**

Potential SRMA <sup>1</sup>	Acres	Other Descriptive Information
Bryant Mountain	15,000	Large mountain complex between Stukel Mountain and Gerber Block with potential recreation sites at Captain Jack Lake, Harpold and Smith Reservoirs.
Gerber Block	101,000	Large, solid block of public lands offering fishing, hunting, camping, picnicking, and wildlife viewing opportunities. Potential hiking trails on Miller Creek, Gerber Potholes, and Barnes Valley Creek. Potential recreation sites at the Bump-heads; Pitchlog Creek; Antelope, Big Adobe, Dog Hollow, Twenty-one, Kilgore, and Willow Valley Reservoirs
Hamaker Mountain	1,200	High-elevation peak south of Keno, Oregon. Good snow conditions with easy access during winter. Potential for developing ski trails and snow-mobile trails for winter use, trail bike and mountain bike trails for summer use.
Spencer Creek	300	Undeveloped scenic stream corridor with outstanding opportunities for wildlife viewing, hunting, fishing, camping, hiking, and nature study. Potential for overnight camping facilities and barrier-free hiking trail along Spencer Creek.
Stukel Mountain	12,000	High-elevation peak southeast of Klamath Falls. Potential for hang-gliding launch site, target shooting areas, day use and overnight recreation sites (Van Meter Reservoir) and OHV/mountain bike/hiking/horseback trails.
Swan Lake Rim	10,000	High-elevation uplifted rim providing outstanding opportunities for solitude and viewing scenery. Potential for hiking/horseback trail and/or OHV trail. Potential day-use and overnight camping sites are along the rim.

<sup>1</sup> SRMA = Special Recreation Management Area

Source: Western Oregon Digital Database and resource area recreation inventory records.

through BLM-administered lands. No National Back Country Byways are currently nominated in the planning area; however, it does have two potential byways.

Existing and potential recreation sites are described in Table 3-29 and displayed on Map 3-11. Existing and potential trails and potential back country byways are described in Table 3-30 and displayed on Map 3-12.

Recreation use, including all activities occurring within existing special recreation management areas and extensive recreation management areas, totaled slightly more than 268,000 recreation visits in 1990. This use estimate is based on results of the 1988 Statewide Comprehensive Outdoor Recreation Plan, the most recent database available for estimating existing recreational use, and was prorated for BLM-

administered lands in this Statewide Comprehensive Outdoor Recreation Plan region.

Table 3-31 shows total recreation visits in 1990 for 11 separate use categories. Other land-based visits (nature study, wildlife observation, outdoor photography, visiting interpretive displays, and picnicking), motorized travel visits (sightseeing and exploring), and camping visits (all modes of overnight camping) accounted for 47 percent of total visitation and were the most popular activities in 1990. Fishing, off-highway travel (motorcycles, all-terrain vehicles and 4-wheel drive vehicles), non-motorized travel (day and overnight hiking/backpacking on trails, bicycling off road, and horseback riding), and hunting accounted for 40 percent. No other use category accounted for more than 6 percent of total visitation.

Table 3-28. Recreation Site Key for Map 3-11.

Existing Recreation Sites/Areas	Potential Recreation Site/Area
R- 1 Pacific Crest National Scenic Trail SRMA	R- 1p Old Baldy
R- 2 Surveyor Recreation Site	R- 2p Johnson Creek
R- 3 Topsy Recreation Site	R- 3p Beaver Ponds/Tunnel Creek
R- 4 Klamath River Complex SRMA	R- 4p Old Shasta
R- 5 Stan H. Spring	R- 5p Spencer Creek - potential SRMA
R- 6 Gerber Potholes	R- 6p Johnson Prairie
R- 7 Gerber Recreation Site	R- 7p Greensprings Highway
R- 8 Miller Creek	R- 8p Dixie
R- 9 Wildhorse	R- 9p Wild Gal Springs
R-10 Upper Midway	R-10p Klamath Overlook
R-11 Basin Camp	R-11p Fox Lake
R-12 Rock Creek	R-12p Clover Creek
R-13 Klamath River Put-In	R-13p Hamaker Mountain - potential SRMA
R-14 Klamath River BLM Campground	R-14p Squaw Point
R-15 Lower Klamath Hills <sup>1</sup>	R-15p Hogback Mountain
R-28 East Gerber Boat Ramp <sup>2</sup>	R-16p Swan Lake Rim - potential SRMA
R-30 Pitchlog Creek <sup>2</sup>	R-17p Swan Lake Rim - trail access
	R-18p Stukel Mountain - potential SRMA
	R-19p Stukel Mountain - target practice
	R-20p Van Meter Reservoir
	R-21p Stukel Mountain - hang gliding launch
	R-22p Bryant Mountain - potential SRMA
	R-23p Harpold Reservoir
	R-24p Smith Reservoir
	R-25p Captain Jack Lake
	R-26p Gerber Block
	R-27p Ben Hall Creek
	R-29p Barnes Valley Creek - trail access
	R-31p Big Adobe Reservoir
	R-32p Dog Hollow Reservoir
	R-33p Twenty-one Reservoir
	R-34p Bumpheads Reservoir
	R-35p Kilgore Reservoir
	R-36p Antelope Reservoir
	R-37p Willow Valley Reservoir
	R-38p Bryant Mountain Horse Camp <sup>3</sup>
	R-39p Hamaker Mountain snow parks <sup>3</sup>
	R-40p Klamath River Powerhouse site <sup>4</sup>
	R-41p Round Valley Reservoir <sup>4</sup>

Abbreviation Used: SRMA = Special Recreation Management Area

<sup>1</sup> Lower Klamath Hills is an existing semi-developed recreation site. Refer to Map 2-8 Existing and Proposed Recreation Sites/Areas for location.

<sup>2</sup> East Gerber Boat Ramp and Pitchlog Creek are existing semi-developed recreation sites inaccurately shown as potential sites on Map 3-11.

<sup>3</sup> Not shown on Map 3-11. Refer to Map 2-8 Existing and proposed Recreation Sites/Areas for location.

<sup>4</sup> Not shown on Map 3-11 or Map 2-8. Map available for review at the Klamath Falls Resource Area office.

**Table 3-29. Existing and Potential Recreation Sites.**

Site Name	Acres	1990 <sup>1</sup> Visits	Amenities
<i>Existing Developed Sites</i>			
Gerber	300	2,600	50 camp units, two picnic units, Frog Camp day use area, and boat ramp at Gerber Reservoir
Surveyor	10	500	5 camp units at headwaters of Johnson Creek
Topsy	12	2,000	15 camp units, one picnic unit at John C. Boyle Reservoir, and a boat ramp
Klamath River Put-in	5	5,000	Day-use boat launch and parking area
<i>Existing Semi-Developed Sites</i>			
Lower Klamath Hills	10	1500	Two day-use parking areas for hunting area
Basin Camp	10	200	Two camp units on the Main Haul Road
Klamath River Campground	10	1,500	Five camp units at upper Klamath River
Miller Creek	10	200	Two camp units above Miller Creek
Gerber Potholes	35	400	Two camp units at Potholes Reservoir and One Watchable Wildlife day use area.
Rock Creek	3	50	One camp unit at Rock Creek
Stan H. Spring	15	200	Two camp units at Gerber Reservoir
Upper Midway	10	500	Two camp units at Upper Midway Reservoir
Wildhorse	7	100	Two camp units at Wildhorse Creek
East Gerber Boat Ramp	5	100	One day-use area on Barnes Valley Creek
Pitchlog Creek	10	50	One camp unit at Pitchlog Creek
<i>Potential Sites</i>			
Clover Creek	30	N/A <sup>2</sup>	Potential day-use site at Clover Creek, potential off-highway vehicle area at abandoned quarry, potential snow park area in winter
Johnson Creek	80	N/A	Potential camping sites at Johnson Creek
Dixie	20	N/A	Potential day-use/interpretive site at old Dixie townsite
Fox Lake	10	N/A	Potential camping sites at Fox Lake
Greensprings Highway	20	N/A	Potential day-use/interpretive site along Highway 66
Klamath Overlook	40	N/A	Potential camping site on Klamath River rim
Beaver Ponds	190	N/A	Potential camping and picnicking sites at Buck Lake/Tunnel Creek area
Old Baldy	80	N/A	Potential day-use area/trailhead for Pacific Crest Trail
Wild Gal Springs	80	N/A	Potential camping site at Wild Gal Springs
Old Shasta	40	N/A	Potential camping and picnicking site on Kent Peak
Johnson Prairie	10	N/A	Potential camping site on Johnson Prairie
Squaw Point	10	N/A	Potential day-use/waterfowl viewing area on upper Klamath Lake
Hogback Mountain	10	N/A	Potential day-use/hang-gliding launch site
Spencer Creek	20	N/A	Potential walk-in camping sites and fishing access along Spencer Creek
Hamaker Mountain Sno Park	30	N/A	Potential winter sno-parks/summer day use facilities on Hamker Mountain

Table 3-29. Existing and Potential Recreation Sites (continued).

Site Name	Acres	1990 <sup>1</sup> Visits	Amenities
Swan Lake Rim Access	5	N/A	Potential trail access for Swan Lake Rim and the Oregon, California, and Eastern Rail-Trail
Stukel Mountain Aspen Grove	10	N/A	Potential primitive camping/day use site at Aspen Grove, Stukel Mountain
Stukel Mountain Target Practice	20	N/A	Potential target practice area on Stukel Mountain
Van Meter Reservoir	10	N/A	Potential primitive camping/day use site on Stukel Mountain
Stukel Mountain Glider Launch	5	N/A	Potential hang gliding launch on top of Stukel Mountain
Harpold Reservoir	2	N/A	Potential primitive camping/day use site on Bryant Mountain
Smith Reservoir	3	N/A	Potential primitive camping/day use site on Bryant Mountain
Captain Jack Lake	3	N/A	Potential primitive camping/day use site on Bryant Mountain
Ben Hall Creek	5	N/A	Potential primitive camping/day use sites on Gerber Block
Barnes Valley Creek access	1	N/A	Potential trail access for Barnes Valley Creek, Gerber Block
Big Adobe Reservoir	3	N/A	Potential primitive camping/day use site in Gerber Block
Dog Hollow Reservoir	2	N/A	Potential primitive camping/day use site in Gerber Block
Twenty-one Reservoir	3	N/A	Potential day use/watchable wildlife site in Gerber Block
Bumpheads Reservoir	3	N/A	Potential primitive camping/day use site in Gerber Block
Kilgore Reservoir	2	N/A	Potential day use/watchable wildlife site in Gerber Block
Antelope Reservoir	5	N/A	Potential primitive camping/day use/watchable wildlife site in Gerber Block
Willow Valley Reservoir	5	N/A	Potential primitive camping/day use site in Gerber Block
Bryant Mountain Horse Camp	2	N/A	Potential horse trail access/camping area on Bryant Mountain
Klamath River Powehouse site	5	N/A	Potential camping/day use interpretive site on Klamath River
Round Valley Reservoir	2	N/A	Potential day use/watchable wildlife site in Gerber Block

<sup>1</sup> The most current recreation visitation estimates for BLM-administered sites, trails, and potential special recreation management areas are for 1990. Visitation estimates are derived from traffic counts at selected locations, receipt envelopes collected at some developed recreation sites, and observations by resource area employees.

<sup>2</sup> N/A = Not applicable

Source: Western Oregon Digital Database and resource area recreation inventory records including the 1990 Recreation Management Inventory System.



Table 3-30. Existing and Potential Recreation Trails.

Trail Name	Miles	1990 <sup>1</sup> Visits	Other Descriptive Information
<i>Existing Trails</i>			
Miller Creek	0.25	500	Provides access from BLM campground to Miller Creek Dam
Pacific Crest National Scenic Trail	0.5	10,000	Half-mile segment in Klamath Falls Resource Area in the Old Baldy area
Pederson	5.0	500 <sup>2</sup>	Provides snowmobile trail link between Hyatt Lake and Lake of the Woods
Klamath River Edge	2.5	1,000	Provides non-motorized access above and below the Klamath River campgrounds
<i>Potential Trails</i>			
Applegate National Historic Trail	2	N/A <sup>3</sup>	Portion of trail corridor in Klamath Falls Resource Area
Barnes Valley Creek	3	N/A	Would provide hiking/horseback access to scenic canyon east of Gerber Reservoir
Bryant Mountain	16	N/A	Potential hiking/horseback riding trails and off-highway vehicle trails
Hamaker Mountain	5	N/A <sup>3</sup>	Would provide winter sports and mountain bike trail network
Chase Mountain	13	N/A <sup>3</sup>	Potential off-highway vehicle loop trail on existing "jeep" roads
Upper Klamath River	10	N/A	Potential hiking/horseback trail on south side
Upper Klamath River	8.5	N/A	Potential fishing/whitewater scouting trail on north side
Miller Creek	13	N/A	Would provide hiking/horseback trail access to Miller Creek Canyon
Spencer Creek	2	N/A	Potential barrier-free hiking/fishing access trail along Spencer Creek
Swan Lake Rim	14	N/A	Would provide hiking/horseback/off-highway vehicle trail along Swan Lake Rim
Stukel Mountain	9	N/A	Potential off-highway vehicle trail
Johnson Creek	3	N/A	Potential hiking/old growth interpretive loop trail from Surveyor recreation site
Old Baldy	3.5	N/A <sup>4</sup>	Potential access trail linking Pacific Crest Trail with Surveyor recreation site
Surveyor Mountain	30	N/A <sup>2</sup>	Potential snowmobile trail network on Surveyor Mountain
Clover Creek	0.5	N/A	Potential off-highway vehicle trail in abandoned rock quarry
Potholes	4.5	N/A	Potential barrier-free watchable wildlife/waterfowl viewing trail
Gerber Point	2.5	N/A <sup>2</sup>	Potential loop trail linking Gerber Recreation site with Gerber frog camp
Topsy Road	15	N/A	Potential nomination for the National Back Country Byway System
Modoc/Gerber Area Trail	30	N/A	Potential nomination for the National Back Country Byway System

<sup>1</sup> The most current recreation visitation estimate for BLM-administered trails are for 1990. Visitation estimates are derived from pedestrian counts at selected trailhead locations and observations by Klamath Falls Resource Area employees.

<sup>2</sup> Not shown on Map 3-12. Shown on Map 2-10, Existing and Proposed Trails and Byways.

<sup>3</sup> N/A = not applicable

<sup>4</sup> Not shown on Map 3-12 or 2-10. See draft Resource Management Plan Map 3-12.

Source: Western Oregon Digital Database and resource area inventory records



**Table 3-31. Total 1990 Recreation Visits to BLM-Administered Land.**

Recreation Use Category	Recreation Visits	Percent of Total Visitations
Other Land-Based Visits	48,600	18
Motorized Travel	43,800	16
Camping	32,900	13
Fishing	30,400	11
Off-Road Travel	27,900	11
Nonmotorized Travel	26,600	9
Hunting	22,100	8
Other Water-Based Visits	14,300	5
Boating	10,500	4
Winter Sports	6,000	3
Snowmobiling	4,500	2
<b>Total</b>	<b>267,600</b>	<b>100</b>

Source: Oregon State Parks and Recreation Department 1988

Although conflicts among various recreation uses may occur at times, there are no known significant user conflicts currently occurring. This is because there are thousands of acres within the existing extensive recreation management area and potential special recreation management area, where recreation use at any given time and location is relatively light. It is anticipated that the capacity of the extensive recreation management areas and potential special recreation management areas to handle foreseeable recreation use will not be exceeded for many decades.

Use of developed recreation sites is currently at or near design capacity on only a few weekend days from June to August. Recreation site visitation mid-week during this period rarely exceeds 50 percent of design capacity at Topsy and Gerber recreation sites. At the end of the planning period, use of existing recreation sites is expected to reach design capacity throughout the June to August period on most weekend days only. For the balance of the year when the sites are open to public visitation, use is expected to be about 50 percent of design capacity.

## Timber Resources

As a result of the reorganization of the Medford and Lakeview BLM districts (effective October 1, 1988), the Klamath Falls Resource Area of the Lakeview District acquired 54 percent of the Klamath Sustained Yield Unit from Medford, as well as a few scattered parcels outside the sustained yield unit. These lands are all west of Highway 97. Because most of the Oregon and California land inventory data is collected at the sustained yield unit level, the Medford District and the Klamath Falls Resource Area will have data common to each of their timber sections.

Public domain land east of Highway 97 and the few isolated parcels of public domain land near the town of Keno, Oregon are also managed by the Klamath Falls Resource Area. In the following tables forest land within the Klamath sustained yield unit is considered west side and public domain forest land outside the sustained yield unit is considered east side.

The planning area contains 57,400 acres of commercial forest land suitable for long-term timber production. These lands support predominantly mixed conifer species consisting of ponderosa pine, Douglas fir, white fir, shasta red fir, sugar pine, and western white pine.

In 1976, a Timber Production Capability Classification inventory was conducted on west side lands (see BLM Handbook 5251-1). The Timber Production Capability Classification inventory identified the physical and biological capability of district lands to produce timber products on a sustained yield basis. In 1988, a new inventory was done on the west side using a more current Timber Production Capability Classification system. The Timber Production Capability Classification inventory was completed on east side lands in 1984, and updated in 1988. Differences in terminology, structure, and acreage prevent direct comparisons between east and west side Timber Production Capability Classification inventories.

Table 3-32 shows the 1988 Timber Production Capability Classification inventory summary for the planning area. Appendix S provides additional information on the inventories.

The west side forest lands were inventoried in 1976 and 1988 to estimate timber volume and age class distribution. The 1976 values were available for the entire Klamath sustained yield unit only, not just the Klamath Falls Resource Area's portion; therefore, west side acreage and volumes shown in Table 3-33 were approximated by multiplying the whole sustained yield unit

**Table 3-32. Timber Productivity Capability Classification (TPCC) Summary as of October 1, 1988.<sup>1</sup>**

	O&C <sup>2</sup> (acres)	Public Domain (acres)	Total (acres)
<i>West Side</i>			
<b>Non-forest</b>			
Rockland, brush, grass	890	400	1,290
Water	40	40	80
Highway	1,780	130	1,910
Utility	180	120	300
Agriculture	0	0	0
<b>Nonsuitable woodland</b>			
Fragile nonsuitable	350	20	370
<b>Suitable woodland</b>			
Low site	2,580	1,410	3,990
Non-commercial species	570	500	1,070
Nonsuitable commercial forest land (reforestation problem)	80	70	150
<b>Suitable commercial forest land</b>			
Non-problem	0	0	0
Fragile suitable	0	0	0
Cat. I - reforestation problem	39,880	2,080	41,960
Cat. II - reforestation problem	0	0	0
Reforestation problem and fragile (combination)	110	0	110
<b>Total</b>	<b>46,460</b>	<b>4,770</b>	<b>51,230</b>
<i>East Side</i>			
<b>Non-forest</b>			
Rockland, brush, grass		61,140	61,140
Water		6,320	6,320
Highway		4,920	4,920
Utility		380	380
Agriculture		30	30
<b>Nonsuitable woodland</b>			
Fragile nonsuitable		0	0
<b>Suitable woodland</b>			
Low site		1,710	1,710
Non-commercial species		69,790	69,790
Nonsuitable commercial forest land (reforestation problem)		4,400	4,400
<b>Suitable commercial forest land</b>			
Non-problem		12,120	12,120
Fragile suitable		0	0
Cat. I - reforestation problem		3,210	3,210
Cat. II - reforestation problem		0	0
Reforestation problem and fragile (combination)		0	0
<b>Total</b>		<b>164,020<sup>3</sup></b>	<b>164,020<sup>3</sup></b>

### Chapter 3 - Affected Environment

<sup>1</sup> East side lands outside the commercial forest lands were remapped in 1993-1994, and updated acres are shown here. East side commercial forest land acres displayed are adjusted from the draft Resource Management Plan Table 3-29, and show commercial forest lands after previously pending land exchange negotiations have been completed.

<sup>2</sup> O&C = Oregon and California lands. There are no Oregon and California lands on the east side; therefore, this column is blank.

<sup>3</sup> Includes approximately 3,000 acres of Bureau of Reclamation withdrawals managed by BLM under interagency cooperative agreement.

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#### Terms used:

**Woodland:** Forest land not included in the suitable commercial forest land base, which includes all noncommercial and unsuitable forest land.

**Nonsuitable woodland:** All fragile nonsuitable forest land.

**Fragile nonsuitable:** A Timber Productivity Capability Classification indicating forest land that has inherent fragile conditions.

**Suitable woodland:** Forest land occupied by minor conifer and hardwood species not considered in the commercial forest land probable sale quantity determination and referred to as noncommercial species (these species may be considered commercial for fuelwood, etc. under woodland management). Also included are low site and unsuitable commercial forest land. These lands must be biologically and environmentally capable of supporting a sustained yield of forests products.

**Noncommercial (low site):** Sites that produce less than 20 cubic feet per acre per year of commercial tree species.

**Noncommercial:** Sites producing forest tree species that are typically used as non-saw timber products.

**Nonsuitable commercial:** Sites that would take longer than the required number of years to meet or exceed minimum stocking levels of commercial species.

**Commercial:** Forest land that is now producing or is capable of producing at least 20 cubic feet of wood per acre per year of commercial tree species.

**Suitable commercial:** Commercial forest land that is determined to be capable of sustained long-term timber production.

**Non-problem:** Commercial forest land that can be stocked to meet or exceed target stocking levels of commercial species within five years of harvest using standard practices, and which is classified non-fragile.

**Fragile suitable:** Sites where forest yield productivity may be reduced due to soil erosion, mass wasting, reduction of nutrient levels, reduction of moisture supplying capacity, and/or rise in groundwater table.

**Category I commercial forest land:** Sites that can be reforested within five years of harvesting using artificial regeneration and operational reforestation practices, or natural regeneration.

**Category II commercial forest land:** Sites that can be reforested within 6 to 15 years of harvest using natural and/or artificial regeneration in all forest types.

**Reforestation problem and fragile (combination):** Commercial forest land that is classified as fragile suitable where operational reforestation practices, in addition to standard practices, are necessary to meet or exceed minimum stocking levels of commercial species within five years of harvest for category I lands. The regeneration period for category II lands is 6 to 15 years.

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Table 3-33. Comparison of Planning Area Timber Inventory Data 1976 and 1988.

Age Class	Acres		Cubic Foot Volume (thousands)		Board Foot Volume (thousands)	
	1976 <sup>1</sup>	1988	1976 <sup>1</sup>	1988	1976 <sup>1</sup>	1988
<i>West Side</i>						
0	800	0	0	0	0	0
1-5	110	3,140	0	0	0	0
10	400	2,260	0	0	0	0
20	1,200	1,990	0	0	0	0
30	190	1,550	390	1,065	1,909	5,143
40	60	360	127	587	632	3,018
50	110	910	279	1,160	1,403	6,178
60	1,220	2,500	3,353	3,779	17,035	19,561
70	130	3,740	374	7,599	1,919	38,950
80	2,410	4,190	7,665	9,126	39,677	47,242
90	1,140	2,300	3,855	13,677	20,125	77,044
100	750	1,370	2,695	7,637	14,180	43,309
110	1,520	830	5,733	4,223	30,388	24,177
120	820	1,480	3,220	8,374	17,189	48,210
130	1,220	730	5,022	3,431	27,005	19,560
140	60	840	240	4,024	1,298	22,977
150	3,100	650	13,725	4,034	74,858	24,443
160	170	1,020	782	7,719	4,296	45,174
170	680	240	3,174	1,808	17,553	10,583
180	960	20	4,626	66	25,766	373
190	390	2,150	1,940	13,389	10,885	77,847
200+	16,250	8,800	156,259	62,110	550,381	369,458
<i>East Side</i>						
0	1,740	1,950	0	750	0	1,478
1-5	0	90	0	112	0	577
10	0	30	0	0	0	0
20	0	1,150	0	1,187	0	6,476
30	0	150	0	364	0	2,021
40	770	500	577	778	251	4,186
50	0	850	0	1,127	0	5,220
60	720	1,230	306	1,877	1,345	10,405
70	5,950	1,070	5,301	1,379	23,484	6,114
80	4,900	1,700	4,119	2,213	18,454	11,201
90	3,050	2,400	3,509	2,833	15,932	14,422
100	1,310	1,550	2,152	1,908	9,922	11,188
110	800	800	964	1,259	4,549	6,564
120	0	550	0	955	0	4,956
130	720	250	1,489	200	7,387	2,447
140	0	200	0	534	0	3,128
150	0	0	0	0	0	0
160	0	0	0	0	0	0
170+	740	1,800	1,266	3,340	5,270	16,630

<sup>1</sup> These data were not available for the Klamath Falls Resource Area's portion of the Klamath Sustained Yield Unit. The 1976 numbers were approximated by multiplying the sustained yield unit numbers by 54 percent to get the Klamath Falls' portion.

Table 3-34. Forest Area and Growing Stock by Ownership and Timbershed (1989).

Owner	Forest land		Available growing stock <sup>1</sup> (million cubic feet)
	Available (thousand acres)	Unavailable	
Klamath-Lakeview Timbershed <sup>2</sup>			
Public			
National Forest	1,802	453	2,984
Other (including BLM)	131	0	356
Private			
Forest Industry	802	0	1,063
Nonindustrial	169	0	257
<b>Total</b>	<b>2,904</b>	<b>453</b>	<b>4,660</b>
Medford Timbershed <sup>3</sup>			
Public			
National Forest	381	312	1,374
BLM	384	153	1,413
State and other	27	6	50
Private			
Forest Industry	343	0	466
Nonindustrial	268	0	545
<b>Total</b>	<b>1,403</b>	<b>471</b>	<b>3,848</b>

<sup>1</sup> National Forest growing-stock data are based on 9-inch diameter at breast height to a 6-inch top for natural stands and 7-inch diameter at breast height to a 4-inch top for managed stands. The BLM and state data are based on 7-inch diameter at breast height to a 4-inch top for all stands. Private data are based on 5-inch diameter at breast height to a 4-inch top for all stands.

<sup>2</sup> Includes Klamath and Lake counties.

<sup>3</sup> Includes Josephine and Jackson counties.

Source: Timber for Oregon's Tomorrow-The 1989 Update.

values by 54 percent (the Klamath Falls Resource Area's portion of the sustained yield unit). The east side forest lands were inventoried in 1976 and 1984 (updated to 1988). Differences in terminology, structure, and acreage prevents direct comparisons of the inventories.

Suitable woodlands and suitable commercial forest lands are two categories of land that are capable of sustaining a long-term yield of forest products without loss of site productivity. Suitable commercial forest lands are capable of yielding at least 20 cubic feet per acre per year of commercial timber and are capable of prompt reforestation, while suitable woodlands include other non-fragile land that produces either commercial or non-commercial species (Appendix S describes juniper woodlands).

The Medford portion of the Klamath sustained yield unit is included as part of the Medford timbershed, while the

Klamath Falls Resource Area's portion of the sustained yield unit as well as the east side of the Klamath Falls Resource Area is part of the Klamath-Lakeview timber-shed. Forest area and volume of growing stock by ownership is shown for the Medford and Klamath-Lakeview timbersheds in Table 3-34. The data presented in this table cannot be directly compared with Table 3-33 because the timbersheds are comprised of parts of more than one BLM district.

Table 3-35 shows the volume of timber harvested by county and ownership, including BLM-administered land in Jackson County (22.6 percent), and Klamath County (5.4 percent).

Planned and actual accomplishments for timber management and forest development are shown in Table 3-36.

Table 3-37 shows acres of stand treatments accomplishments by age class.

# Ecosystem Health

## Forest Health

A healthy forest is able to remain productive, resilient, and stable over time and to respond to stresses caused by drought or insect attack. While widespread tree death indicates poor forest health, the death of individual trees or groups of trees is a natural part of healthy ecosystems. Healthy ecosystems contain pathogens and insects which create habitat niches for such wildlife species as woodpeckers and arboreal rodents.

There are two principal causes of risk to forest health: introduced insects or diseases and management practices which have interfered with natural ecosystem functions. Where fire- or wind-induced mortality is very low or absent, the probability of insect and disease outbreaks increase, as does mortality associated with root diseases (Waring and Schlesinger 1985). Moderate disturbances initiated by fires, insects, wind, and diseases act to maintain the structural and species diversity of forests (Hanson, Spies, Swanson and Ohmann 1991).

The suppression of disturbance, together with past approaches to management, has resulted in some components of southwestern Oregon ecosystems being outside the estimated range of historic variation in the rate of conifer mortality or in the type and rate of seral development. A primary concern over forest conditions has arisen from the accelerated, widespread mortality of conifers, especially on lands within the pine series.

On hot, dry sites in southern Oregon, without understory disturbance, shade tolerant species regenerate in the understories of large intolerant trees. As competition for moisture intensifies, large overstory trees die because their respiratory requirements cannot be met. Then as the tolerant trees grow larger, they begin to die in drought years at sizes far smaller than the large intolerant species that they replaced. The restoration of stand vigor, for specific tree species in hot, xeric (dry) environments requires thinning to lower stand densities than what is required on more mesic (average moisture conditions) sites. In many instances, stand densities required need to be less than those produced by traditional commercial thinnings.

**Table 3-35. Timber Volume <sup>1</sup> Harvested by County and Ownership (1983-1988).**

Year	County	Forest Industry <sup>2</sup>	Other Private <sup>2</sup>	State <sup>2</sup>	BLM <sup>3</sup>	National Forest <sup>4</sup>	Other Public <sup>2</sup>	Total
1983	Klamath	293,620	5,380	8,540	24,990	231,020	0	563,550
	Jackson	118,725	6,120	10	96,650	173,615	210	395,330
1984	Klamath	36,210	3,030	5,815	34,995	250,370	0	330,420
	Jackson	112,510	9,285	0	110,500	118,685	0	350,980
1985	Klamath	159,550	4,065	2,045	8,650	241,860	0	416,170
	Jackson	189,980	4,440	1,700	111,300	182,685	25	490,130
1986	Klamath	146,260	4,470	10,945	19,280	281,930	0	462,885
	Jackson	186,085	3,350	1,080	80,500	142,400	0	413,415
1987	Klamath	171,300	4,750	3,980	27,725	308,425	0	516,180
	Jackson	118,895	6,730	3,340	107,000	131,690	0	367,655
1988	Klamath	177,575	10,981	654	35,535	320,487	0	545,232
	Jackson	167,516	8,596	7,101	124,100	167,422	0	474,735

<sup>1</sup> Thousand board feet - Scribner Log Scale (includes volume removed, softwood and hardwood, as logs, poles, and pilings but not volume removed from woodcutting operations).

<sup>2</sup> Compiled by Oregon State Department of Revenue.

<sup>3</sup> Compiled by Bureau of Land Management.

<sup>4</sup> Compiled by United States Forest Service, Region 6

SOURCE: Oregon Timber Harvest Reports, Oregon Department of Forestry



Table 3-36. Timber Management and Forest Development Accomplishments to October 1, 1991.

Practice	Planned 10-1-91	Accomplished 10-1-91
<i>West Side (Jackson and Klamath SYUs)</i>		
Harvest (ASQ Contributing Volume)	Volume	Volume
Million Cubic Feet	222.99	172.48
Million Board Feet	1,298	1,004
Harvest Area (ASQ Contributing Acres)	Acres	Acres
Reproduction Cut	37,013	26,250
Overstory Removal	27,307	21,152
Commercial Thinning	16,240	5,750 <sup>1</sup>
Prescribed Fire <sup>2</sup>	35,105	23,907
Herbicide Use	30,357	3,809
Manual Vegetation Treatment	0	21,557
Brush and Hardwood Conversion	0	774
Planting <sup>3</sup>		
Standard Stock	52,453	58,459
Genetic Stock	0	914
Animal Damage Control <sup>4</sup>	0	35,733
Pre-commercial Thinning	8,491	10,327
Fertilization	24,731	9,020
<i>East Side</i>		
Harvest (ASQ Contributing Volume)	Volume	Volume
Million Cubic Feet	3.4	3.7
Million Board Feet	15.4	17.8
Harvest Area (ASQ Contributing Acres)	Acres	Acres
Clearcut	0	125
Partial Cut	8,800	4,601
Prescribed Fire	0	5,100
Herbicide Use	0	19
Manual Vegetation Treatment	0	20
Planting		
Standard Stock	495	729
Genetic Stock	0	0
Animal Damage Control	0	2,819
Pre-commercial Thinning	550	633
Fertilization	0	0

Abbreviations Used: ASQ = Allowable Sale Quantity

<sup>1</sup> Includes all non-regeneration partial cuts in commercial thinning aged stands.<sup>2</sup> Includes broadcast burn, handpile and burn, and tractor pile and burn.<sup>3</sup> Table 1-1 Final Jackson-Klamath Environmental Impact Statement adjusted to 9 years minus Supplemental Environmental Impact Statement revision in harvest acres (9,000).<sup>4</sup> Includes browse protection and gopher baiting and trapping.

Table 3-37. Acres of Stand Treatments Accomplished by Age Class.<sup>1</sup>

Age Class	Genetically Selected Stock	Pre-commercial Thinning	Commercial Thinning	Overstory Removal	Fertilized
<i>West Side</i>					
10	0	0	0	1,276	0
20	0	725	0	351	148
30	0	735	0	594	499
40	0	0	0	201	0
50	0	0	749	0	45
60	0	0	3,372	0	496
70	0	0	3,190	0	239
80+	0	0	7,009	0	611
<b>Total</b>	<b>0</b>	<b>1,460</b>	<b>14,320</b>	<b>2,422</b>	<b>2,038</b>
<i>East Side</i>					
10	0	0	0	0	0
20	0	320	0	62	0
30	0	240	0	77	0
40	0	73	0	141	0
50	0	0	0	30	0
60	0	0	139	32	0
70	0	0	88	7	0
80	0	0	77	10	0
90	0	0	100	3	0
100	0	0	62	31	0
<b>Total</b>	<b>0</b>	<b>633</b>	<b>466</b>	<b>393</b>	<b>0</b>

<sup>1</sup> October 1, 1980 through September 30, 1988.

More fundamental to the loss of individual or groups of trees, the forest remaining after mortality or salvage is a less vigorous, less productive forest composed of more tolerant species that will continue to show mortality, perhaps ending in the wholesale mortality of stands with patterns similar to that seen in the Blue Mountains.

Changes in the frequency, intensity and type of stand disturbance have resulted in the development of stands that are outside the range of natural variation in seral development for the site and for the habitat type. Because seral development is following a different pathway, these stands exhibit species composition, levels of mortality, and structural characteristics different from natural stands.

Because of the stressed conditions of these stands, insects and disease organisms have the potential to

cause higher levels of mortality and/or lower growth rates compared to their historic ranges. Stressed characteristics are sometimes accentuated by the choice of species planted in regeneration units or the choice of species left during partial-cutting.

Within the planning area, deteriorating forest health is most obvious in four situations.

- ♦ Low elevation forests of the ponderosa pine and Douglas fir series on dry, hot sites are experiencing significant levels of mortality. Mortality is associated with drought and insect attack, but is most obvious in stands with high density or where understory Douglas fir and hardwoods have invaded pine sites. These conditions are associated with fire suppression since the early 1900s in stands adapted to frequent fire return. Re-introduction of

fire, heavy thinning to reduce stand density, removal of low vigor trees during salvage, and regeneration harvests which reintroduce pine as the dominant species within the pine series forests or on drier sites could improve stand vigor and stability.

- ◆ Ponderosa pine plantations in the mixed conifer and mixed evergreen forest zones often show poor growth, may not be genetically adapted to the moist mid-elevation sites, and tend to be infected with disease, particularly Bynum's Blight.
- ◆ White fir series forests of the Cascade Mountains are experiencing a shift away from their natural species composition and density. This is largely due to fire suppression, and partial-cutting entries which did not sufficiently imitate the level of natural disturbance necessary to begin secondary successional processes. These forests are beginning to experience accelerated mortality of their pine component and may be more susceptible to disease.
- ◆ Many plant communities have been invaded by human-introduced plants or plant diseases. The most affected include plant communities which contain a high proportion of five-needle pines (affected by pine blister rust), riparian zones, and low elevation grasslands subjected to heavy utilization by livestock (that is, areas invaded by introduced plants, such as starthistle).

## Range Health

Much like forest ecosystems, range land ecosystems must have certain requirements met in order to remain stable, productive, and resilient to the stresses caused by drought, grazing, and other pressures, both naturally occurring and human induced. Range lands in improper ecosystem health are generally typified by decreases in native perennial grasses and forbs with increases in exotic (non-native) annuals, sagebrush, and sometimes juniper.

Grazing at improper levels, intensity, and/or season, in conjunction with the suppression of fire, have pushed range land plant communities towards these less desirable compositions. As Vavra et al. (1994) states, "Herbivores affect their habitats and therefore the habitat of other land users directly by defoliation and by trampling vegetation and soil. Herbivores exert indirect

effects through redistribution of minerals and plants, changes in microenvironments, altering soil and hydrologic properties, influencing energy flow, and unbalancing competition among plants through selective grazing."

Grazing animals habitually select plant species that are more palatable and tender, for example native perennial grasses and forbs, and avoid coarser, less palatable plants such as sagebrush. This has caused an historical shift in many plant communities, over the past 125+ years of livestock grazing, to compositions dominated by fewer, less palatable plant species. Often these less diverse plant communities, which are outside of the range of natural variability, do an unsatisfactory job of soil retention. This can set into motion a cycle of soil erosion and gradual deterioration that, if left unchecked, can reduce the inherent long term productivity of the land. However, due to the low and highly variable nature of precipitation on most western range lands, the potential for quick response and improvement of vegetative conditions to any particular management enhancement is invariably slow. Grazing enclosure type studies (comparisons of grazed and ungrazed areas next to each other) which have been done in numerous locations throughout the west have shown that it often takes many decades for vegetative changes to occur.

When grazing occurs over time at no more than moderate grazing levels, plant communities have the ability to maintain a species complexity that maintains or leads to a healthy community structure. As Vavra et al. (1994) also state, "Livestock create patches (diversity) when the grazing is light to moderate, but prolonged heavy grazing reduces diversity; so does no grazing. Grazing is a tool that can maintain plant succession at a certain stage thereby maintaining biological diversity." Plant communities have permanently changed in virtually all range land type vegetation communities in the west. As long as people continue to interact with the environment, they (or their domestic animals) will set fires, scatter litter, carry seed, and impact the landscape in various ways which will likely never allow "pristine" conditions to return. What is important for the future health of range land type ecosystems is not the exact reconstruction of pre-European settlement conditions, but that the land be managed for plant communities that do maintain a healthy, proper functioning of the ecosystem.

(See Appendix S for an expanded discussion on juniper woodlands.)

# Energy and Mineral Resources

Since 1980, mineral activity has consisted primarily of rock production for BLM, county, and state roads and highways. Exploration for locatable minerals has been minimal with no plans and only one notice having been filed. Leasable mineral activity in the past has been for geothermal resources, oil, and gas. Geothermal exploration occurred during the mid- to late-seventies, but no activity has occurred in the last decade. During the oil and gas leasing boom, from the mid-seventies to mid-eighties, three leases totaling 7,762 acres were issued, and were later terminated or relinquished. The only recorded oil and gas exploration was a geophysical survey in the extreme northwest portion of the planning area in 1985.

As of February 29, 1994 there were 23 recorded mining claims: There was one mining notice and no mining plans of operation, geothermal or oil and gas leases, and no exploration permits. Average annual rock production from BLM pits and quarries is about 80,000 cubic yards from 18 active sources. The BLM administers the mineral estate on 208,665 acres of public land and 21,200 acres of split estate (federally-owned minerals with non-federally-owned surface).

**Mineral potential**, as referred to in this document, relates to the potential for the occurrence, not the development, of a mineral. Table 3-38 summarizes mineral potential for locatable, leasable, and salable minerals. The potential for locatable minerals varies (see Map 3-13). Based upon known occurrences, the geologic environment, and geologic inference, there is

moderate potential for mercury and perlite, and moderate to high potential for diatomite. In some areas, the geologic environment suggests moderate potential for gold, silver, copper, lead, zinc, and antimony.

**Leasable minerals** include oil, gas, and geothermal resources. The entire planning area has moderate potential for oil and gas, based on geophysical data and the identification of a possible hydrocarbon occurrence by the U.S. Geological Survey (Tennyson and Parrish 1987). Based on the presence of hot springs, hot wells, abnormally high heat flow, and the presence of relatively young volcanic rocks, 1,428 acres of public land and 80 acres of split estate land in the Klamath Falls, Olene Gap, and Klamath Hills areas have been classified as a known geothermal resource area. The known geothermal resource area has high potential for geothermal resources (see Map 3-14). The remainder of the planning area is considered to have moderate potential for geothermal resources because abnormally high heat flow, hot springs and wells, and relatively young volcanic rocks also occur to a lesser extent outside the known geothermal resource area.

**Salable mineral potential** varies from moderate to high (see Map 3-15). Because of the extensive lava flows and outcrops throughout the planning area, the potential for rock is moderate. High potential for rock and cinders occurs around active quarries and pits and known deposits.

It is the BLM's policy to encourage exploration and development of minerals using environmentally sound practices. Most land in the planning area is open to such activities. There are no areas of critical mineral potential in the Klamath Falls Resource Area.

**Table 3-38. Mineral Potential.**

Mineral Type	Mineral Potential (acres)			
	Low/Unknown	Moderate	High	Total
Locatable	99,000	128,000	900	227,900
Leasable, Oil and Gas	0	230,700	0	230,700
Leasable, Geothermal	0	227,800	1,500	229,300
Salable	0	228,000	1,300	229,300

Note: Differences in acreage totals are due to mineral reservations and acquired lands.

## Socioeconomic Conditions

For the purposes of socioeconomic description, the Klamath Falls Resource Area has been equated to Klamath County. Information regarding population, employment, and personal income has been examined to determine the basic structure and scope of the economy in the resource area. A 1984 to 1988 baseline has been selected to represent average economic conditions in the region. All data in this section refers to this baseline period, unless otherwise stated. The selected baseline encompasses a period of national recovery and growth that followed the recession of the early 1980s. Klamath County, like many non-metropolitan areas of the state, was slower to show economic growth after the recession. This is one indicator that the county has limited economic diversity. Additional information regarding recent trends has been included, when available, to provide a context for current decisions.

During the baseline period, population in Klamath County averaged 57,330 with 65.5 percent of those persons living in unincorporated areas (Center for Population Research and Census 1991). The 1990 Census population has been estimated to be 57,702 with 64.8 percent living in unincorporated areas. Population during 1992 has been estimated at 59,400. Net out-migration from Klamath County in 1980 to 1990 has been estimated at 5,187. Approximately 14 percent of Klamath County's population is over 65, which is the same as the statewide percentage (Center for Population Research and Census 1991).

Southern Oregon has traditionally been economically dependent upon natural resources. Timber, fisheries, agriculture, and recently tourism provide significant employment in the region. The wood products sector (including paper) employed an average of 3,608 people (1984 to 1988). Trade (4,838 employees) and government (4,286 employees) were the only two sectors with greater employment. In 1990, employment in the wood products industry decreased by 410 jobs, from a high in 1989 of 3,780. An additional 460 jobs were lost in 1991 and 40 in 1992. Between July 1988 and February 1994, the Oregon Employment Division recorded one cutback and a final mill closure in the wood products sector affecting 741 jobs in Klamath County. This represents a 20.5 percent reduction of the baseline period average wood products employment (see Tables 3-39 and 3-40).

While employment in the wholesale and retail trade industries increased over the baseline period, they experienced small declines in 1988 and 1991. Employ-

ment in the service sectors increased. Government employment (including federal, state, and local governments, and public education) also increased, experiencing declines in 1987 and 1989. Recently, employment growth in all sectors, except construction and mining, has slowed, suggesting a combination of out-migration from the area and workers leaving the labor force. Unemployment in Klamath County peaked during 1986 at 12 percent. Rates steadily declined, reaching a low of 7.8 percent in 1989. In 1990 and 1991, unemployment in the county increased to 9.3 percent, and to 10.7 percent in 1992.

Personal income information is an indicator of wealth in a particular area. This is because income statistics track both wage and non-wage income sources. Non-wage income sources include transfer payments, interest, dividends, and rent. In Klamath County, where a large portion of residents are retired, this is particularly important. Retirees derive income from a variety of sources other than wages. Per capita income in Klamath County averaged \$11,376. Statewide, average per capita income was significantly higher, averaging \$13,308. In recent years the trend has been a widening of this gap (see Tables 3-41 and 3-42).

## Local Economic Activities

The proposed Salt Caves hydroelectric project is a locally-initiated development designed to enhance the economic base of the region. At its peak the proposed project would generate 539 jobs, including 319 people hired locally. Construction wages and local expenditures could be as high as \$37.5 million, or \$12.5 million annually during the three-year construction period. During the operation phase, net revenues to the City of Klamath Falls could be as high as \$6.8 million. According to the Final Environmental Impact Statement, the Salt Caves Project, after all debt is retired, net revenues could be \$29.8 million (FERC 1990). The City of Klamath Falls intends to use one to two million dollars of the annual revenues to fund its economic development program, Operation Bootstrap. Operation Bootstrap would establish a private, nonprofit corporation to invest this money in equity financing of small industries in the county to diversify the regional and local economy. Proposed programs, which are expected to create up to 500 primary jobs per year, include research and development programs, seed capital programs, an investor computer network, enterprise expansion programs, intelligence age programs, and a business incubator program. Construction of the Salt Caves project depends on permitting, licensing, and approval from many agencies, including the BLM.



**Table 3-39. Resident Labor Force, Employment by Industry, Oregon.**

	1970	1980	Average 1984-88	1989	1990	1991	1992
Civilian Labor Force	864,500	1,295,000	1,362,400	1,475,000	1,491,000	1,508,000	1,537,000
Unemployment	61,700	107,000	104,800	84,000	82,000	90,000	115,000
Total Wage and Salary Emp.	709,200	1,044,600	1,068,680	1,209,400	1,251,900	1,250,800	1,270,900
Total Manufacturing	172,300	215,100	203,240	218,400	220,300	211,700	207,400
Lumber and Wood Products	76,200	79,900	75,060	76,400	73,200	65,800	63,300
Other Manufacturing	96,100	135,200	128,180	142,000	147,100	145,900	144,100
Total Non-Manufacturing	536,900	829,500	865,440	991,000	1,031,600	1,039,000	1,063,500
Construction and Mining	30,800	48,800	35,800	47,600	54,000	53,000	51,100
Transportation, Communications, and Utilities	48,700	60,500	58,040	63,100	64,500	65,200	65,500
Trade	162,000	255,600	269,680	305,900	313,100	314,300	320,200
Finance, Insurance, and Real Estate	36,000	70,000	69,360	75,900	80,300	83,200	86,000
Services and Miscellaneous	112,700	191,400	231,180	282,900	296,200	296,900	309,900
Government	146,700	203,200	201,360	215,600	223,500	226,400	230,900



Table 3-40. Resident Labor Force, Employment by Industry, Klamath County.

	1970	1980	Average 1984-88	1989	1990	1991	1992
Civilian Labor Force	19,310	26,910	25,184	26,150	25,670	25,090	26,040
Unemployment	1,350	2,780	2,626	2,050	2,400	2,340	2,790
Total Wage and Salary Employment	15,240	20,180	19,072	21,050	20,740	20,020	20,730
Total Manufacturing	3,870	4,940	4,464	4,810	4,380	3,830	3,780
Lumber and Wood Products	3,460	4,370	3,608	3,780	3,370	2,940	2,900
Other Manufacturing	410	570	856	1,030	1,010	890	880
Total Non-manufacturing	11,370	15,240	14,608	16,250	16,360	16,190	16,950
Construction and Mining	470	620	412	510	570	590	700
Transportation, Communications, and Utilities	1,460	1,510	982	1,010	1,040	980	930
Trade	3,290	4,780	4,838	5,140	5,140	4,950	5,310
Finance, Insurance, and Real Estate	610	810	854	960	930	940	950
Services and Misc.	2,260	3,170	3,244	4,060	3,970	4,000	4,200
Government	3,280	4,350	4,286	4,570	4,710	4,370	4,850

**Table 3-41. Local Area Personal Income by Industry, Oregon.**

	1970	1980	Average 1984-88	1989	1990	1991
Total personal income	8,163,400	26,053,992	36,647,682	45,188,249	48,744,661	51,111,885
Population (thousands)	2,100	2,642	2,693	2,791	2,861	2,922
Per capita personal income (dollars)	3,887	9,863	13,598	16,193	17,038	17,495
Farm	235,598	474,419	558,796	887,987	902,618	875,029
Non-farm	6,191,140	18,903,314	25,431,683	31,599,836	34,259,527	35,858,962
Agricultural services, forestry, fisheries, and other	45,970	153,099	279,316	354,802	406,179	413,179
Mining	15,256	101,468	48,332	44,598	54,463	62,441
Construction	409,967	1,373,943	1,297,393	1,783,668	2,063,099	2,114,244
Manufacturing	1,579,414	4,749,512	5,809,247	6,969,524	7,204,428	7,340,506
Nondurable goods	406,845	1,073,769	1,401,383	1,650,289	1,769,440	1,869,165
Paper and allied products	98,990	287,975	368,584	414,698	418,696	431,657
Durable goods	1,172,569	3,675,743	4,407,864	5,319,235	5,434,988	5,471,341
Lumber and wood products	641,124	1,684,758	1,962,060	2,182,055	2,087,623	1,962,324
Transportation and public utilities	546,832	1,538,631	2,048,669	2,394,109	2,535,167	2,698,171
Wholesale trade	440,505	1,436,555	1,823,268	2,333,046	2,527,784	2,626,699
Retail trade	795,358	2,235,839	3,044,078	3,668,902	3,950,646	4,190,681
Finance, insurance, and real estate	304,149	1,000,050	1,269,971	1,545,520	1,710,894	1,753,013
Services	944,887	3,328,738	5,519,321	7,324,212	8,175,474	8,612,905
Government and government enterprises	1,108,802	2,985,479	4,292,088	5,181,455	5,631,393	6,047,123
Federal, civilian	262,232	609,044	849,918	1,025,116	1,127,937	1,171,540
Military	35,662	67,919	116,768	128,780	136,391	140,620
State and local	810,908	2,308,516	3,325,402	4,027,559	4,367,065	4,734,963

Table 3-42. Local Area Personal Income by Industry, Klamath County.

	1970	1980	Average 1984-88	1989	1990	1991
Total personal income	187,842	525,156	657,253	778,155	813,260	839,703
Population (thousands)	50	59	57	57	58	58
Per capita personal income (dollars)	3,733	8,870	11,542	13,621	14,043	14,421
Farm	9,505	18,727	10,427	27,608	23,799	14,717
Non-farm	140,108	356,744	426,695	505,586	523,366	535,940
Agricultural services, forestry, fisheries, and other	2,891	3,361	5,823	6,130	7,422	7,408
Mining	(L)	1,523	NA	(L)	(L)	(L)
Construction	7,571	20,260	16,206	20,015	22,447	23,339
Manufacturing	36,814	111,142	125,960	145,730	136,974	132,055
Nondurable goods	2,224	4,865	5,810	6,243	8,829	9,526
Paper and allied products	0	0	NA	0	0	0
Durable goods	34,590	106,277	120,150	139,487	128,145	122,529
Lumber and wood products	33,154	101,897	111,315	126,587	116,198	112,136
Transportation and public utilities	16,451	36,467	35,139	41,011	41,115	40,646
Wholesale trade	5,045	16,430	22,441	26,503	26,468	27,563
Retail trade	18,628	46,599	56,476	63,761	69,353	70,563
Finance, insurance, and real estate	3,475	10,691	12,960	14,927	14,229	14,005
Services	16,396	51,862	70,535	90,662	97,783	105,369
Government and government enterprises	32,803	58,409	80,811	96,841	107,602	114,962
Federal, civilian	8,473	14,598	19,292	24,855	28,770	30,349
Military	9,001	2,003	1,822	2,063	2,149	2,168
State and local	15,329	41,808	59,697	69,923	76,683	82,445

Source: Bureau of Economic Analysis, Region Economic Information System.

The Oregon Institute of Technology is the only accredited polytechnic college in the Pacific Northwest and enjoys an outstanding national and international reputation. One of the eight member institutions of the Oregon State System of Higher Education, Oregon Institute of Technology offers accredited bachelor's and associate's degree programs in the engineering, health, business, and nursing disciplines. Oregon Institute of Technology has a 180-member faculty and a student body of approximately 2,600. Oregon Institute of Technology's annual budget is \$24 million, approximately 80 percent of which is gross salaries (Harris 1991 pers. comm.).

Merle West Medical Center is a growing health care facility that has approximately 826 employees. For fiscal year 1992, the facility had a gross operating revenue of \$55.6 million and a gross salary budget of \$18.5 million (Flores 1991 pers. comm.).

Transportation forms a major economic element in Klamath County. Two railroads, the Sante Fe/Southern Pacific and Burlington Northern, as well as bus, truck, and airlines serve the county. For the year 1989, utilities and transportation had a combined gross income of \$41 million (Oregon Employment Division 1992).

Tourists spent \$39 million in Klamath Falls in 1989 and tourism generated 3.2 percent of the total employment in the county (Runyan 1989). The number of visitors to the Klamath Falls visitor center has tripled from 1989 to 1991 (Klamath County Department of Tourism 1991). Public participation in the Klamath Basin Bald Eagle Conference annually exceeds the available convention space. The Klamath Basin Wildlife Refuges attract approximately 400,000 visitors annually.

The Klamath County Development Association is a private non-profit corporation, formed for the purpose of providing industrial development, retention, and expansion; and a diversified industrial base within the Klamath region. The association has been successful in attracting several firms in electronics-related fields.

In addition, local, state, and federal government agencies (such as the departments of the Interior, Agriculture, and Defense) are major contributors to the local economy.

## **BLM Economic Contribution**

BLM-administered lands in Oregon make significant contributions to local economies. Timber harvest supplies local mills and grazing is available to cattle ranchers. Many sport fisheries depend on fish reared in stream reaches managed by the BLM. Tourists bring new dollars into local communities, and counties receive payments from the BLM in accordance with a

variety of current laws. For planning purposes an input-output model (BLMPACT) was developed to estimate economic impacts of BLM management on local economies. Models were developed to represent each BLM district in western Oregon, as well as the region as a whole.

The BLM currently manages 58,280 acres of commercial forest land in the Klamath Falls Resource Area that are suitable for long-term timber production. The average annual harvest from this land between 1984 to 1988 totaled 19.5 million board feet, or approximately 5.5 percent of harvest from all ownerships in the county. The U.S. Forest Service harvests totaled 61.8 percent of all harvests, and private industry harvests were 31.6 percent. The remaining 0.9 percent was harvested from state lands. The average annual harvest from BLM-administered lands is estimated to contribute 100 jobs in the timber industry and \$2.7 million in direct local personal income. Re-spending effects added 70 jobs and \$0.79 million in other sectors.

The BLM timber sales have been halted by court injunction since 1991. No significant harvests have occurred on BLM managed lands since 1990 because of the injunction.

The BLM provides for public use of special forest products consistent with other land uses and resource allocations. Free use collection of mushrooms, huckleberries, elderberries and other products provides a unique and rewarding recreational opportunity for many individuals. Traditional, ceremonial, and subsistence uses are also met through free use collection.

In addition, negotiated and advertised sales provide significant receipts and contribute to local employment. In 1989 floral greenery sales within the Pacific Northwest were estimated to generate \$128 million within the regional economy and employ 10,000 people. (Schlosser et. al. 1992)

Tables 3-15 and 3-16 (in the Special Forest/Natural Products section) identify types of forest resources collected in the Klamath Falls Resource Area and quantity collected for those items documented through permitting or sale. In western Oregon the total BLM collections associated with the sale of special forest/natural products totaled \$2,355,000 between Fiscal Year 1987 and Fiscal Year 1991.

Most BLM-administered lands are available for recreational use by the general public. Opportunities exist for site-specific and dispersed recreational use. Common activities include: hunting, fishing, driving for pleasure, horseback riding, off-highway vehicle use,

and boating. Community economic impacts occur when visitors from out of the region make purchases in the local economy. These "new" dollars create jobs and enhance personal income. It is assumed that the total level of local spending is not directly influenced by the recreation opportunities provided on BLM-administered lands. The BLM estimates that a total of 17,300 annual visits were made to its lands by non-residents. Among these visitors were 1,800 hunters and 1,900 fishermen. Total non-resident non-consumptive visitors totaled 13,600. The BLMPACT model suggests that spending by these visitors generated 12 direct jobs and 0.11 million dollars in local 1 personal income. Re-spending effects added 5 jobs and 0.06 million dollars in local personal income.

The Klamath Falls Resource Area administers grazing use on 95 allotments covering 207,214 acres. Average Active Preference totaled 13,869 animal unit months. The typical season of use is May 1 through July 31 with an average length of 2.8 months. The BLMPACT model estimated that these permits directly contributed \$1.5 million to agricultural output. Total agricultural output in Klamath County averaged \$80,825,400. Direct personal income and employment contributions were estimated at \$92,000 and 14 jobs. Total (direct, indirect, and induced) personal income and employment were estimated at \$322,000 and 37 jobs.

State and local governments receive money from timber harvest activities and as compensation for taxes foregone due to public ownership of lands. Changes in these payments impact local government employment and the services they provide.

Fifty percent of the total revenue generated by timber sales on Oregon and California lands is distributed to western Oregon counties using a formula based on the original assessed value of Oregon and California lands within each county. The average annual payment to Klamath County during the baseline period was \$1,750,939 (BLM Facts various years). Payments for the most recent years were as follows:

- ◆ 1989, \$2,547,558;
- ◆ 1990, \$4,766,842;
- ◆ 1991, \$1,616,694;
- ◆ 1992, \$2,773,093; and
- ◆ 1993, \$1,838,923.

Unlike payments to counties from timber sales in the national forests, which are required to fund schools and roads, the Oregon and California payments enter

directly into the county general fund and can be spent without restriction. In some counties this is a substantial portion of the general fund. Recently, annual legislation has provided additional "safety net" payments to the counties. These payments guarantee revenue to the counties at levels slightly less than receipts in past years. These "safety net" payments have mitigated a large portion of the county revenue impacts of reduced BLM harvests under the current court injunction.

The counties also receive Payments in Lieu of Taxes from the BLM for its non-Oregon and California lands, as well as for agency lands such as national forests, national parks, federal water projects, Army Corps of Engineers dredge disposal areas, some national wildlife refuges, and some military installations. These annual payments of 75 cents per acre, subject to a per capita ceiling, are reduced to a minimum of 10 cents per acre when other revenue-sharing activities make equivalent payments. In western Oregon each county receives the minimum payment. During the baseline period, Klamath County received an average annual payment of \$208,978 (BLM Facts various years). Payments for the most recent years were as follows:

- ◆ 1989, \$214,491;
- ◆ 1990, \$214,486;
- ◆ 1991, \$214,442;
- ◆ 1992, \$214,474; and
- ◆ 1993, \$215,538.

These payments are not expected to change significantly under any foreseeable BLM management strategies.

As a legacy of the U.S. General Land Office, the BLM manages former homestead lands. Approximately 5 percent of the revenues generated by these public domain lands are dispersed through the state to the counties based on total land area of the county. The counties must use this money to build roads and bridges. Average annual payment to the state during the baseline period was \$329,905 (BLM Facts various years). Payments for the most recent years were as follows:

- ◆ 1989, \$622,684;
- ◆ 1990, \$1,524,574;
- ◆ 1991, \$859,804;
- ◆ 1992, \$895,322; and
- ◆ 1993, \$561,970.

The State of Oregon collects a harvest tax on every thousand board feet of timber harvested in the state to fund forest improvement and protection. Table 3-43

displays historic tax rates. The purchasers of BLM timber pay this tax.

The impact of Ballot Measure 5 property tax limitation is independent of federal taxation, spending, revenue sharing, and land management. However, it is an important economic condition that is influencing county funding in western Oregon. In general, urbanized counties in western Oregon have reduced tax rates to comply with the law. Most rural counties are at or approaching the maximum permitted tax rates. For this reason it is generally accepted that western Oregon counties will be unable to generate additional or substitute revenue through property tax rate increases if revenue from federal and other sources declines.

## Community Stability

The previous sections describes economic indicators and trends as well as ongoing economic activities within the planning area. The discussion focused on the 1984-1988 baseline period. In the years following the baseline period the nation experienced a national recession. In Oregon, the economies of the urban centers of Portland, Salem, and Eugene remained relatively strong. However, non-urban areas were particularly hard hit experiencing population, employment and personal income losses. Two additional factors contributed to changes in rural areas in western Oregon.

Reduced federal timber harvests since the baseline period have impacted the lumber and wood products industry. In Klamath County, harvests from BLM managed lands were reduced to zero in 1991 and 1992 from a baseline average harvest of 19.5 million board feet (BLM Facts various years).

Impacts of reduced harvest levels are occurring amidst ongoing structural changes in the lumber and wood products industry. Examples of structural changes include decreasing labor intensity, increasing use of smaller diameter logs, increased competition and specialization, expansion of international markets for wood products, increased use of substitute building materials, expanded use of oriented strand board, and increased production and use of laminates and engineered wood products.

Current changes in the structure and size of the timber industry in Klamath County are causing substantial economic and social impacts (Lee et al. 1991). Social impacts associated with these recent economic dislocations include unemployment, loss of income, increased needs for social services, and out-migration from particularly distressed areas.

The Oregon Economic Development Department has prepared a report on communities and counties severely affected by recent trends in the timber industry (Oregon Economic Development Department 1993). A community or county is considered severely affected if it meets one of two criteria:

**Table 3-43. Forest Products Harvest Tax Rates Applicable to BLM Timber Purchasers.**

Period	Forest Practices Act	Forest Research Lab	Emergency Fire Fund	Forest Resources Inst.	Industrial Fire Prevention	Total Tax Rate
7/1/83-6/30/85	\$0.12	\$0.23	\$0.15	\$0.00	\$0.00	\$0.50
7/1/85-6/30/86	\$0.10	\$0.21	\$0.00	\$0.00	\$0.00	\$0.31
7/1/86-6/30/89	\$0.10	\$0.21	\$0.15	\$0.00	\$0.00	\$0.46
7/1/89-6/30/91	\$0.16	\$0.21	\$0.30	\$0.00	\$0.00	\$0.67
7/1/91-6/30/93	\$0.39	\$0.30	\$0.50	\$0.31	\$0.14	\$1.64
7/1/93-12/31/94	\$0.56	\$0.40	\$0.66	\$0.31	\$0.21	\$2.14

SOURCE: Oregon Department of Revenue. Personal Communication, Rick Schaeck. July 1991. Personal Communication, Gwen Gilcrest. October 1993.



- ◆ The community has experienced a four percent decline in timber industry employment since 1989 compared to the total 1990 workforce in the community; or
- ◆ The community demonstrates it has suffered or is likely to suffer severe economic decline, and the Oregon Economic Development Department director declares it severely affected.

These areas are eligible for assistance through the Oregon Timber Response Program. This program provides dollars to train displaced workers, to fund public works projects, and to fund loans for businesses. Klamath County has been identified as severely affected.

An Oregon State University Extension Service Publication examined these severely affected counties and communities within Oregon. Using Census data for 1980 and 1990 the report found that these timber dependent areas lagged behind non-timber dependent areas. On average, these counties and communities experienced no population growth, declining median household income, higher unemployment and poverty rates, and lower educational attainment (Seidel 1993).

Within the community, the Klamath County Development Association is active in efforts to expand and diversify the local economy. The association has focused on Klamath County's central location in regard to major west coast population centers, its transportation facilities, and livability in its efforts to attract new manufacturing enterprises.

## Rural Interface Areas

Klamath County has planned and zoned some private forest and range lands intermingled with BLM-administered lands as rural residential and non-resource. In the rural residential zones, minimum allowable lot size ranges from 1 to 5 acres. In the non-resource zone, the minimum lot size is normally 20 acres, although there are lot sizes from 6 to 20 acres. Single family homes are allowed outright for the 1- to 5-acre zones and allowed with conditions in the larger acreage zones. In the Klamath Falls Resource Area little development of non-resource lands has occurred. Zoning ordinances can restrict non-resource uses, such as disallowing the construction of buildings unless they are necessary to manage forest resources. Ordinances can also allow non-resource uses with certain conditions, such as placing a dwelling so it does not

interfere with accepted forestry practices. These provisions are intended to reduce the possibility of conflicts between residential uses and forest/range management activities.

Residential uses can conflict with intensive forest and range management activities on BLM-administered lands. To address these conflicts in this plan, those areas zoned as rural residential that include or adjoin BLM-administered land have been labeled rural interface areas (see Map 3-16).

Rural interface areas exist throughout the planning area and consist primarily of recreational home site developments that have varying degrees of occupancy and include private and BLM-administered land within  $\frac{1}{2}$  mile of the interface line. The  $\frac{1}{2}$ -mile distance was selected as a probable zone of influence; the analysis of impacts in Chapter 4 also considers a  $\frac{1}{4}$ -mile zone of influence. Although conflicts have occurred where lots are larger than 20 acres, these larger-lot areas will not be analyzed due to limited inventory data. Most of these areas have not been identified and none have been mapped.

The Klamath Falls Resource Area contains approximately 10,500 acres of land identified as rural interface. Total BLM-administered land within rural interface areas is approximately 3,050 acres within the  $\frac{1}{4}$ -mile zone of influence and 4,500 acres within the  $\frac{1}{2}$ -mile zone of influence, with the remainder being privately owned.

Conflicts in Klamath County between the BLM's land management goals and activities and BLM's rural neighbors have been minimal. Land management actions that could impact adjacent private landowners are reviewed with the landowners prior to implementation. As management intensity on rural interface land increases, the frequency and intensity of conflict could be expected to increase.

## Livestock Grazing

Livestock grazing in the Klamath Falls Resource Area is administered on 95 allotments (see Table 3-44 and Map 3-17). Licenses for grazing in these allotments are issued annually to approximately 81 permittees or lessees. Early in 1982, the BLM implemented a new grazing management policy, known as selective management, to help assign management priorities among grazing allotments. Under selective management, all the grazing allotments within the Klamath Falls Resource Area were categorized into one of three groups (see Table 3-44) to direct management efforts

Table 3-44. Summary of Allotment Categorization.

Category	Number of Allotments	BLM-Administered Land (acres)	Active Preference Animal Unit Months (AUMs)
<i>West Side</i>			
I - Improve	2	14,407	622
M - Maintain	0	0	0
C - Custodial	8	36,510	929
<i>East Side</i>			
I - Improve	12	97,403	7,387
M - Maintain	4	11,801	603
C - Custodial	69	48,941	4,121
<b>Total</b>	<b>95</b>	<b>209,062</b>	<b>13,662</b>

and funding to the areas of greatest need. The three categories are improve (I), maintain (M), and custodial (C). The category name refers to the management objective, so that the I category is to improve unsatisfactory conditions; the M category is to maintain satisfactory conditions; and the C category is to manage in a custodial manner the prevention of deterioration of current resource conditions. The primary criteria used in arriving at these categorizations were ecological condition, resource conflicts, economic feasibility of investments in range improvements, and the land ownership pattern (see Appendix L, Selective Management section, for more information).

After the allotments have been categorized, grazing systems are developed to manage livestock to achieve multiple-use objectives while still allowing a sustainable forage allocation. Allotment management plans are then implemented when the grazing system, forage allocation, needed range improvements, and management conflicts and concerns have been identified through an interdisciplinary process. There are presently 13,662 animal unit months of active preference allocated to livestock. There are 5,096 animal unit months held in suspended non-use. Appendix L lists

allotment category, active preference, and suspended non-use livestock animal unit months, along with animal unit months allocated to wildlife and wild horses by allotment.

Grazing lands in the Klamath Falls Resource Area are administered mainly under sections 3 and 15 of the Taylor Grazing Act. The BLM-administered land grouped into a specific grazing district is administered under section 3, while those lands outside a specified grazing district are administered under section 15.

Grazing on the east side of the resource area is regulated by both sections 3 and 15 of the grazing act. Eight I allotments and one M allotment in the Gerber Block are regulated by section 3, and four I allotments and three M allotments are regulated by section 15.

Grazing on the west side of the resource area is regulated under section 15 of the grazing act. There are ten grazing allotments on the west side, which tend to have small amounts of public land in very large allotments. Generally on the west side, the ecological condition of the range land is fair. Most resource conflicts are identified in the two I allotments. Grazing

## Chapter 3 - Affected Environment

systems are currently being developed and implemented on a trial basis for both of these allotments. The remaining eight allotments are categorized as C allotments because the small scattered tracts of public land intermingled with private land increase the difficulty of prescribing intensive grazing systems.

The Gerber Block, with its 90,000-acre block of public land, is being managed to enhance numerous wetland and riparian resources. Short-duration, high-intensity grazing systems specifically designed to improve riparian and wetland resources have been implemented to varying degrees on the I allotments. This practice of rotating moderate livestock numbers through smaller pastures for short periods of time during the growing season has greatly improved riparian-wetland conditions and upland bunchgrasses and shrubs. In addition to intensified grazing management, small livestock exclusions have been constructed to enhance wetlands for waterfowl habitat. Although these exclusions are not allocated animal unit months for livestock, they may receive livestock grazing occasionally to manipulate vegetation for waterfowl habitat improvement.

Although both the section 3 Gerber Block lands and section 15 lands on the east side exhibit similar resource conflicts, the need for improving resource conditions is more obvious on many east side section 15 lands because of the scattered ownership pattern and the less desirable ecological condition. The four I allotments on east side section 15 lands are being inventoried and monitored to establish baseline data for implementing multiple-use allotment management plans. Two M allotments are being managed through the Yainax Butte Coordinated Resource Management Plan and are progressing towards their objectives. The remaining two M allotments have little or no resource conflicts. Several land exchanges have been proposed by private landowners to block larger areas of public land to improve legal access and management of intermingled public lands. The intermingled public and private land pattern requires extensive coordination and consultation with private landowners to develop a balanced multiple use allotment management plans.

An allotment management plan prescribes the manner and extent that livestock grazing is conducted and managed to meet multiple use, sustained yield, economic, and other objectives. A grazing system is generally incorporated into the plan. An allotment management plan is implemented when it is incorporated into the permit or lease and accepted by the permittee(s) or lessee(s), and is operational when

supporting range improvements and the grazing system have been initiated.

Since completion of the Lakeview District Grazing Environmental Impact Statement, five allotment management plans, all in the Gerber Block, have had grazing systems implemented to improve their riparian and upland conditions. One allotment management plan has been incorporated into the Rock Creek Coordinated Resource Management Plan and is progressing toward its objectives. Trial grazing systems have been implemented on three I allotments in the Gerber Block and as monitoring data is evaluated, an allotment management plan will be established.

Range land improvements have been developed to provide livestock forage, improve livestock distribution, and provide for more intensive management of livestock through implementation of grazing systems. These range improvements are also used to protect areas from livestock use. Existing range improvements are summarized in Table 3-45.

Funding for range improvements comes from grazing permittees, BLM funds, Grazing Advisory Board funds, and cooperative agreements with other organizations and agencies.

The *Final Range Improvement Policy* (1982) and the *Range Improvement Policy for Oregon and Washington* (1983) specified that permittees would maintain livestock management fences, reservoirs, waterholes, and springs used primarily by livestock. The BLM is responsible for the maintenance of enclosure and riparian-wetland area fences (if not part of a livestock management fence), cattleguards on BLM-maintained roads, and nonstructural improvements such as seedlings, brush and weed control, and prescribed burns.

Sixteen separate resource management concerns or conflicts related to Klamath Falls Resource Area grazing activities have been identified. Appendix L details the management conflicts and concerns in each allotment, as well as the management objectives that address these concerns.

## Wild Horses

The Klamath Falls Resource Area maintains a viable wild horse herd within the Pokegama Wild Horse Herd Management Area. Since designation of the herd management area after passage of the 1971 Wild

**Table 3-45. Existing Range Land Improvements.**

Type	West Side	East Side	Total
Fences (miles)	15	157	172
Cattleguards (each)	9	33	42
Seedings (acres)	400	3,027	3,427
Reservoirs and Waterholes (each)	22	185	207
Spring Developments (each)	2	40	42
Wells (each)	0	0	0
Pipelines (miles)	0	0	0

Free-Roaming Horses and Burro Act, the wild horse population has ranged from 25 (1972) to 54 (1992) animals. The herd management area lies within the boundaries of the Dixie (107) and Edge Creek (102) allotments (see Map 3-17). A wild herd management area plan was written and approved by the Medford District in 1978. The primary population objective in the plan was to maintain a herd within the range of 30 to 50 animals. The herd area is 20 percent BLM-administered land, 79 percent private land, and 1 percent other federal and state lands. It is located 84 percent in Oregon and 16 percent in California.

There is abundant forage and available water within the two allotments that comprise the herd management area. The herd roams freely between the pastures of the two allotments and moves south into the Klamath River Canyon and California during the winter. Distribution, however, of wild horses (as well as livestock) is not uniform resulting in some localized areas of overutilization, typically wetter meadows, and underutilization of most drier upland areas. Due to the large amount of private lands within the herd management area and the extensive use the herd makes of those lands, only 150 animal unit months of forage are allocated in this plan to the herd. That figure is based on the proportion of BLM-administered lands in the herd management area.

The herd is managed for a maximum population of 50 animals. Although foals are commonly seen, the total population has shown relatively slow long-term growth.

## Fire

The Proposed Resource Management Plan incorporates by reference the analysis of fire in Appendix B of the Supplemental Environmental Impact Statement.

Fire, and other agents of disturbance, such as wind, insects, and diseases, have greatly influenced the development of Pacific Northwest forests. Fine-scale disturbances, generally by insects or diseases, cause deaths of single trees or small groups of trees which result in small patches of early-successional vegetation embedded in a larger portion of older forest. Coarse-scale disturbances, such as fire and wind, result in more extensive areas of early-seral vegetation. Many native forest organisms have adapted to these cycles and scales of disturbance and regrowth. Forest ecosystems are dynamic, changing with or without active management.

Fire is the major natural agent of disturbance within the planning area. The distributions, abundance, and dominance of the major plant communities are strongly affected by the frequency, intensity, and extent of wildfire events. Fire has both direct and indirect effects on the forest environment. These effects vary depending on individual forest stand and plant community conditions and composition, as well as fire intensity. Most of the current late-successional and old growth stands developed from natural regeneration following wildfire events that occurred during the last 200 to 600 years. Some of these fires covered large areas - frequently many thousands of acres. Although these fires were large, they burned in patches of variable



intensity and severity, and left many areas of unburned or lightly burned forest. The natural regime of patchy fires that leave an abundance of large dead trees and lesser amounts of scattered live trees, as individuals and in patches, is the basis for silvicultural methods such as retention of green trees as individuals and in patches. Throughout the planning area, natural disturbance patterns have a long history and were sometimes catastrophic. In other areas, disturbances were frequent and of low magnitude, maintaining open forest stands.

The long-term frequency, intensity, and extent of fire events (known as the "fire regime") depend largely on climate and weather patterns. Fire characteristics also depend upon the available fuel which is related to past forest management practices, including the use of prescribed fire and the effectiveness of wildfire suppression (for example, wildfire exclusion). Smoke emissions from wildfires are also dependent upon stand history and weather conditions.

Interruption of natural fire regimes has a direct effect on ecosystem species composition, and sometimes on species persistence. The near exclusion of natural, low-to-moderate intensity wildfires has resulted in a proliferation of fire-intolerant and shade-tolerant species (for example, true fir species and hardwoods), which are replacing ponderosa pine and Douglas-fir forest types in the drier climates. Changes in long-term soil productivity, stand structure and function, forest health, and biological diversity are also occurring due to the exclusion of fire. The mortality of trees due to insects and disease makes forests more susceptible to high-intensity, stand-replacing fires.

Many natural disturbances do not result in complete mortality of stands. For example, recent fires in the western Oregon Cascades killed 25 to 50 percent of trees within the areas burned, leaving 50 to 75 percent of the stands intact. The surviving trees are important elements of the new stand. They provide structural diversity and a potential source of additional large snags during the development of new stands. Furthermore, trees injured by disturbance may develop cavities, deformed crowns, and limbs that are habitat components for a variety of wildlife species.

Large fires and relatively long fire return intervals in moist portions of some river basins resulted in periods during which landscapes contained large areas of relatively unbroken forest cover. In the warmer, drier landscapes, fire is more frequent, less intense, and is an integral part of the internal dynamics of a typical stand (tens to hundreds of acres). In the drier landscapes, fire control and timber harvest have decreased

the abundance of some types of old growth, such as ponderosa pine, that are dependent on frequent, low intensity fires. Other types of late-successional forest that are less fire resistant or are less desirable for harvest have become more widely distributed. In these areas, the potential for stand-replacement wildfires has increased, resulting in a higher risk to the stability of current stands reserved for late-successional species.

Natural disturbance is an important process within late-successional forest ecosystems, but humans have altered disturbance regimes. Fire suppression has resulted in significant increases in accumulated fuels within some forests, particularly in the eastern Cascades and in southwestern Oregon. At the same time, these forests may have become much more vulnerable to insects and diseases. Due to fire suppression, some forests have become quite dense and multistoried, primarily from the invasion of shade-tolerant species. Total protection might have been a viable short-term strategy in 1910, but it is not viable in the 1990s.

At a landscape scale and over long periods, stand-replacing wildfires have an important role in resetting successional processes and developing new areas of late-successional forests to replace those lost through succession or disturbance. Most plant communities in the planning area are adapted to fire, although at the natural recurrence of fire is at widely varying intervals. Some species require periodic fire for their persistence, and many additional species are well adapted to periodic burning. Fire can also be used effectively in the restoration and maintenance of wildlife habitat. Some plant species require canopy gaps that may have been historically maintained by fire. Fire reduces understory competition, increases light, provides nitrogen, and stimulates germination of some fire-adapted species. The role of fire in the life history of some species warrants further investigation because fire is necessary for the persistence of some species. Underburning may improve habitat for some fire-adapted species. Isolated site-specific reserves are more appropriate where some species with limited distributions are fire intolerant. Without resuming underburning, biological diversity would be diminished by the loss of many native plant species and some plant communities.

The combination and interaction of fire frequency, intensity, and extent that occur in an ecosystem are known as a fire regime. Natural fire regimes vary widely between and across landscapes of the planning area. However, some generalizations can be made to characterize the role of fire in natural ecosystem processes. These descriptions are based on knowledge of pre-European settlement fire regimes derived

from historical accounts, early forest management inventories, and various imprints of fire on forest stands (such as stand ages and other tree ring data). Natural fires regimes are briefly characterized below.

The fire regimes of Pacific Northwest forests span a wide gradient of variation. Natural fire regimes ranged from infrequent (hundreds of years) stand replacement fires, to very frequent (several years) low-intensity surface fires that had little effect on the canopy trees. Although fire regimes can be described on the basis of characters of the disturbance itself, or character of the vegetation, another way is by defining the fire regime on the basis of fire effects, or severity. The system using fire severity is defined in terms of fire effects on dominant tree species, and works well for application to habitat.

A high severity fire is one that topkills most of the vegetation in the stand (70 to 80 percent plus of the basal area); a moderate severity fire topkills 20 to 70 percent of the basal area. Fire, in a silvicultural sense, tends to thin from below, first taking smaller trees and/or those less fire-resistant (thin-barked, for example). The Klamath Falls Resource Area has considerable experience in the effects of prescribed underburning. It must be recognized that each regime is defined on the basis of the modal severity but that fires of other severity levels are likely to occur as well. The most complex fire regimes are the moderate ones because of the mix of expected fire severities, while the low and high fire severity regimes are generally more predictable. Management activities over decades, such as attempted fire exclusion, can change low or moderate severity fire regimes to moderate to high severity fire regimes.

In the moist Douglas-fir forests of the Coast Range of Oregon, fire return intervals are long. Much larger than average events may have occurred in the past as a result of short-term but extreme changes in climate. In the moist climates, natural fire return intervals are quite long, often over 500 years. However, even in the moist climates, fire has been an important ecosystem process in particular microclimates, for example, on long, dry southwest oriented slopes. Patterns of reburns on the Tillamook fire of 1933 at 6-year intervals (1939, 1945, 1951), and at the southern Washington Yacolt burn of 1902 are evidence these landscapes will reburn. High surface fire potential during early succession in Douglas-fir forest was identified by Isaac (1940) as a "vicious cycle" of positive feedback, encouraging rhizomatous bracken fern (*Pteridium aquilinum*); this pattern was quantified by Agee and Huff (1987). Given sufficient sources for reinitiation (for example, the

original Yacolt and Tillamook burns and all reburns are thought to have been human-ignited), the reburn hypothesis is likely to be true in certain areas. However, it is not clear whether reburns were a common event prior to European settlement in the moist portion of the Douglas-fir region. After crown closure, potential surface fire behavior declines, and then gradually increases in the old-growth seral stage.

For many years, the pattern of stand replacement fire was a paradigm of fire for west side Douglas-fir forests. Recent work, particularly in the Oregon Cascades in drier western hemlock plant associations, suggests a higher fire frequency and different ecological role for fire in mesic to dry Douglas-fir forest. Morrison and Swanson (1990) suggest a natural fire rotation of 95 to 145 years during the last five centuries. The patchiness of at least some of the fires is illustrated by the fire severity maps in Morrison and Swanson (1990). A similar fire regime was noted by Means (1982) on dry Douglas-fir sites in the western Oregon Cascades. Using conservative methods that did not recognize underburns with no resulting regeneration or substantial fire-scarring of trees, Teensma (1987) estimated a natural fire rotation of 100 years during the last five centuries. If fires of moderate severity are removed from the analysis, a stand-replacement mean fire return interval is 130 to 150 years, suggesting that intense fires are a significant part of the natural fire regime in this area, but that fires of lower severity also occur. Other stands of 500 years age or older exist without much evidence of recurrent fire.

Before the advent of fire suppression in the early 1900's, wildfires played a major role in shaping the forests of the planning area. Presettlement fire return intervals may be as low as 5 to 10 years (Bork 1985). Intensive fire suppression efforts in the last 60 years have resulted in significant fuel accumulations across broad landscapes, multiple-canopied stands with thick understories, and shifts in tree and understory species composition. These changes may have made forests more susceptible to large, high severity fires and to epidemic attacks of insects and diseases. Such forests, in their present condition, are also more likely to be catastrophically disturbed because of higher physiological stress, caused by increased tree density, higher fire hazard, and higher horizontal and vertical fuel continuity. Fire hazard increases, and fires which were once likely to be benign understory fires of low severity become high severity stand-replacement fires. High severity fires did occur in these low severity regimes but not at the scale they now do. Management plans for late-successional and old growth forests in this province must consider fire management and the stability of forest stands. A total fire protection strategy



### Chapter 3 - Affected Environment

has a fairly low probability of protecting late-successional forest habitat during the next century. There is substantial reason to believe the trend toward large fires will continue, and fire severity will become skewed toward higher severity levels.

Past land use and forestry practices have altered the condition of stands and landscapes throughout much of the planning area. Typically, plantations are densely stocked with young Douglas-fir trees which often increase the occurrence of human-caused wildfires, as well as increase the rate of spread and extent of fire and other disturbances across landscapes. The presence of young plantations may increase the risk of loss of intermingled late-successional forests. This is especially true where fire suppression has led to the development of dense understories of shade-tolerant species that increase the potential for severe fire impacts in the reserves.

Numerous large and destructive fires have occurred in the past decade. The recent period has been characterized by a trend toward larger fires. A more continuous fuel complex over the landscape is at least partially responsible, fuels have increased within protected stands, and clear-cut stands have exposed slash, not all of which has been fuel treated. In 1987, an extensive lightning storm set off more than 600 fires in southern Oregon, including 19 which reached more than 1,000 acres in size. Fire suppression forces were overwhelmed, and some fires burned for months over rough, semiaccessible terrain. A mosaic of fire severity resulted.

A total fire protection strategy has a fairly low probability of protecting late-successional forest habitat during the next century. There is substantial reason to believe the trend toward large fires will continue, and fire severity will become skewed toward higher severity levels. High severity wildfires have provided conditions that allowed brush and hardwood species to dominate some sites for several decades or longer. Management plans for late-successional and old growth forests in this province must consider fire management and the stability of forest stands.

The recent historic fire history of the planning area is shown in Table 3-46.

One objective of ecosystem analysis and management is to identify disturbance regimes and to manage the landscape within that context. The role of fire management in the maintenance of ecosystems within the planning area is well recognized. Fire management activities consist of wildfire suppression, wildfire hazard reduction, and prescribed fire applications. Fire is used or suppressed in the context of achieving ecosystem management objectives at the landscape level.

**Table 3-46. Distribution of Fires by Size Class, 1980 to 1993 Yearly Average**

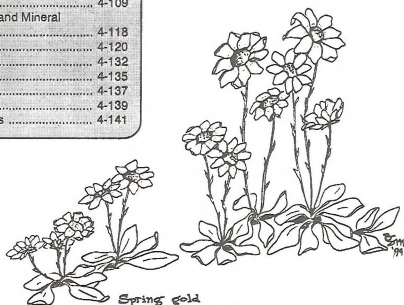
<u>Size Class (acres)</u>	<u>Number of Fires</u>	<u>Number of Acres</u>
0.00 to 0.25	12.0	1.2
0.26 to 9.99	2.8	4.0
10.0 to 99.99	0.7	24.2
100.0 to 999.99	0.4	44.6
greater than 1000.0	0.3	92.0

# Chapter 4

## Environmental Consequences

### Contents

Major Changes from Chapter 4 of the Draft Resource	
Management Plan .....	4-3
Analytical Models .....	4-4
Sensitivity Analysis .....	4-4
Assumptions .....	4-4
Probable Sale Quantity .....	4-5
Ten-Year Representative Timber Management Scenarios .....	4-5
Ten-Year Development Scenarios .....	4-6
Mitigation .....	4-6
Effects of Alternatives .....	4-7
Effects on Global Climate .....	4-7
Effects on Air Quality .....	4-8
Effects on Soil Resources .....	4-11
Effects on Water Resources .....	4-16
Effects on Biological Diversity .....	4-24
Effects on Ecosystem Health .....	4-32
Effects on Vegetation .....	4-35
Effects on Riparian-Wetland Areas .....	4-40
Effects on Wildlife .....	4-44
Effects on Special Status and Supplemental Environmental	
Impact Statement Attention Species .....	4-67
Effects on Fish .....	4-89
Effects on Special Areas .....	4-91
Effects on Cultural Resources, Including American Indian Values .....	4-93
Effects on Visual Resources .....	4-97
Effects on Wild and Scenic Rivers .....	4-100
Effects on Wilderness .....	4-103
Effects on Recreation .....	4-104
Effects on Timber Production .....	4-109
Effects on Exploration and Development of Energy and Mineral	
Resources .....	4-118
Effects on Socioeconomic Conditions .....	4-120
Effects on Rural Interface Areas .....	4-132
Effects on Livestock Grazing .....	4-135
Effects on Wild Horses .....	4-137
Effects on Wildfire .....	4-139
Consistency with Other Agency Plans and Programs .....	4-141



Spring gold  
*Crocodyrum multicaule*



# Major Changes from Chapter 4 of the Draft Resource Management Plan

This Environmental Impact Statement incorporates by reference the conclusions of the Final Supplemental Environmental Impact Statement. Specifically incorporated are conclusions about Alternative 9 of the Final Supplemental Environmental Impact Statement, which is embedded in the Proposed Resource Management Plan.

The Supplemental Environmental Impact Statement special attention species analyses have been summarized in many places and added to the analyses of this Resource Management Plan/Environmental Impact Statement.

Discussion on the effects on wildfire and forest/ ecosystem health have been added.

Based on public comment, decisions such as the Supplemental Environmental Impact Statement Record of Decision, and new information many of the analyses have been expanded or reworked.

## Introduction

In this chapter, the environmental consequences (effects) of implementing the alternatives described in Chapter 2 are defined and compared to the existing conditions and affected environment described in Chapter 3. This chapter is organized by resource. Some of the sections are internally organized by alternative, others by impactor (such as the effect of timber management or livestock grazing on water quality in the Effects on Water Resources section), and others by element of the particular resource (such as compaction/displacement and soil erosion in the Effects on Soil Resources section, or effects on big game or golden eagle in the Effects on Wildlife section). Whenever possible, a summary paragraph was included for each section. A tabular comparison of effects of the alternatives is shown in the resource management plan/environmental impact statement Summary (Table S-2) in the front of this resource management plan/environmental impact statement.

Direct, indirect, and cumulative effects are all considered, to the extent identifiable, in each resource analysis. Direct effects result from activities planned or authorized by the Bureau of Land Management (BLM) under each alternative. Indirect effects generally occur when the public takes advantage of opportunities provided by BLM management. Hunting, fishing, and other recreational activity are examples, as are the effects on socioeconomic conditions. Cumulative effects are those resulting from the combined activities on BLM-administered lands and activities on other public (such as U.S. Forest Service) and private lands.

There are three topics that the National Environmental Policy Act requires environmental impact statements to address in relationship to proposed actions, which are often treated as separate topics:

- ◆ Relationship between short-term uses and long-term productivity.
- ◆ Irreversible or irretrievable commitments of resources.
- ◆ Adverse environmental effects that cannot be avoided.

These topics are addressed, where relevant, as part of the discussion of environmental consequences for each resource.

The baseline period to which predicted future effects are compared is normally 1984 to 1988, the period for which the existing plan was in effect at the start of the Environmental Impact Statement preparation and for which a wide range of relevant baseline data have been gathered and/or published.

Both short- and long-term time frames were considered. Short term is the period of time during which the plan will be implemented, assumed to be at least ten years. Short-term impacts include those resulting from harvest of timber sold during the ten-year period, even though such a harvest may occur two or three years after sale. Long term is the period beyond ten years. Whenever meaningful analysis depended on specificity provided by the ten-year timber management scenario, or for some cumulative effects that are primarily dependent on (forecasting) activities on private land (for example, effect on elk), long-term impacts were not analyzed in detail.

Preliminary analysis, including scoping, indicates that none of the alternatives would significantly affect the

## Chapter 4 - Environmental Consequences

following: geology, topography, agriculture, prime and unique farmlands, floodplains, paleontological values, or biomass-generated renewable energy use. Therefore, these topics are not discussed in this document. Effects of proposed disposals (sale, exchange, or federal agency transfer) of public domain or Oregon and California lands, rights-of-way (linear; powerlines under 69 kilovolts, roads, pipelines under 10 inches, and communication sites), and new transportation corridors are not analyzed in this chapter because each proposal would be evaluated separately in accordance with the National Environmental Policy Act.

Valid existing rights (such as rights-of-way grants issued but not yet constructed, reciprocal rights-of-way agreements, mining claims or leases, and withdrawal of public lands for use by another agency) would continue under all alternatives. Those valid existing rights that could have greater adverse effects on BLM-administered lands and resources include reciprocal rights-of-way and mining claims. The severity of the effect would depend on the location and timing of the action in relation to the sensitive resources. There is no reasonable method to predict or quantify these potential actions; therefore, they are not included in this chapter.

## Analytical Models

Analytical models have been used to assess some effects of the alternatives. These models, like all models of complex biological-physical or economic systems necessarily simplify reality. They also are limited by current knowledge, but represent a synthesis of the knowledge of BLM staff and/or outside scientists familiar with the subjects of concern.

Model evaluation involves extensive validation through testing and comparison of predictions with actual outcomes. In that sense, most of the models used are too new to be validated. In fact, such validation of most of these models would take decades. Nonetheless, they provide the most useful available methods, other than analyst intuition, for comparing probable differences in outcomes from implementation of the various plan alternatives. Confidence in their numbers varies but, in all cases, they are most useful for comparison of the relative consequences of alternatives than for precise predictions.

The application of the models to Alternative C and the Proposed Resource Management Plan are attended

by lower levels of confidence than the analyses of other alternatives. The confidence level in all analyses of the effects of the Proposed Resource Management Plan is also lower because the results of watershed analyses may modify both the rate and location of timber harvests, as well as management prescriptions. Adaptive management, however, will assure that objectives are met.

## Sensitivity Analysis

In addition to analyses of the consequences of the seven land-use allocation alternatives fully analyzed, the BLM has conducted some sensitivity analyses of the effects of varying management approaches. Sensitivity analysis is a process of identifying opportunity costs associated with differing approaches to sensitive land-use allocations and other decisions. It can assist selection of a resource management plan by examining specific trade-offs that could result from making changes in single sensitive elements of an alternative.

Sensitivity analyses of some consequences of several alternatives were conducted during preparation of the draft Resource Management Plan/ Environmental Impact Statement and summarized in Appendix 4-A of that document. Additional sensitivity analysis of the following, as potential changes in the Proposed Resource Management Plan, have been made and are summarized in the Timber Resources section of this chapter.

- ◆ Excluding all critical spotted owl habitat from planned timber harvest (see the Retention or Development of Older Forest section).
- ◆ Forgoing some or all proposed intensive timber management practices (genetic tree selection, fertilization, and precommercial thinning/release).

## Assumptions

The following assumptions were used as a basis for analysis of impacts:

- ◆ Sufficient funding and personnel would be available for implementation of the final decision.
- ◆ The Probable Sale Quantity and annual average silvicultural practices for the alternatives would be approximately as shown in Table 2-1.



- ◆ The alternatives would be continued for many decades.
- ◆ Standard design features described in Chapter 2 will be applied as described. They contain many of the provisions that avoid, minimize, reduce, or eliminate potential environmental effects.
- ◆ Local climate patterns of historic record (See Appendix T for further discussion) and related conditions for plant growth will continue.
- ◆ The analysis of effects assumes that project design features are successfully implemented; however there are times when these features are not used successfully. Therefore, while it is recognized that some unavoidable adverse effects will occur, these operational problems can not be predicted nor quantified and were not considered in the analysis.
- ◆ For analysis of cumulative effects, it is assumed that most private forest lands would be intensively managed with final harvest on commercial economic rotations averaging 80 to 100 years.

## Probable Sale Quantity

The Probable Sale Quantity for the Proposed Resource Management Plan is an estimate of annual average timber sale volume likely to be achieved from lands allocated to planned, sustainable harvest. The use of the probable sale quantity, rather than "allowable sale quantity" recognizes uncertainties in the estimate. Harvest of this approximate volume of timber is considered sustainable over the long term based on the assumptions that the available land base remains fixed, and that funding is sufficient to make planned investments in timely reforestation, plantation maintenance, thinning, genetic selection, forest fertilization, timber sale planning, related forest resource protection, and monitoring.

The probable sale quantity represents neither a minimum level that must be met nor a maximum level that cannot be exceeded. It is an approximation because of the difficulty associated with predicting actual timber sale levels over the next decade, given the complex nature of many of the standards and guidelines. It represents the BLMs best assessment of the average amount of timber likely to be awarded annually in the planning area over the life of the plan, following a start-up period. The actual sustainable timber sale level attributable to the land-use allocations and management direction of the Proposed

Resource Management Plan may deviate by as much as 40 percent from the identified probable sale quantity. The potential variables are discussed in the Timber Resources section of this chapter. As inventory, watershed analysis, and site-specific planning proceed in conformance with that management direction, the knowledge gained will permit refinement of the probable sale quantity and could permit an allowable sale quantity to be declared when a plan decision is made (record of decision signed). The separable component of the probable sale quantity attributable to lands in key watersheds carries a higher level of uncertainty, due to the greater constraints of Aquatic Conservation Strategy objectives and the requirement to do watershed analysis before activities can take place.

During the first several years, it is unlikely that the annual probable sale quantity will be offered for sale. The Proposed Resource Management Plan represents a new forest management strategy. It will take time to develop new timber sales that conform to the Proposed Resource Management Plan.

Average annual timber sale volumes from thinnings in reserves are also estimated. These volumes are unlikely to be offered for sale in the first few years of plan implementation.

## Ten-Year Representative Timber Management Scenarios

A Ten-year Representative Timber Management Scenario has been developed based on the land use allocations for each alternative except the Alternative No Action. Its primary use is to assess potential short-term, site-specific effects associated with timber harvest. The scenarios represent the resource area staff's assumptions of one possible location for timber harvest units and roads. A harvest scenario (harvest units and roads) was built for the land that would be available for timber harvest in Alternative A. This scenario was then adjusted to reflect the changes in land available for timber harvest in the other alternatives, except the Proposed Resource Management Plan.

For Alternatives A through E, random spatial selection of timber harvest units was linked to the TRIM-PLUS allowable sale quantity computer run, to determine the ten-year scenario that would meet management



selection criteria to provide the calculated probable sale quantity identified for the alternative. The selected scenarios were evaluated for practicality by resource area timber sale planners. Estimates of logging practices and average annual levels of associated activities and intensive management practices for the decade of the plan are displayed in Table 4-1. In borderline cases, the estimates assume the practice that results in the greatest disturbance.

For the Proposed Resource Management Plan, the tie to a set of representative harvest units was not performed. One reason is that the representative timber harvest units and roads assumed for Alternative A would not be applicable to the Proposed Resource Management Plan because of its enlarged riparian reserve systems and other changes in the plan. A set of new ten-year representative harvest units could be developed to fit the Proposed Resource Management Plan, except that many of the intermittent streams are not currently mapped in the Geographic Inventory System. Without the full spatial representation of the riparian reserves, the resource area planners would not be able to evaluate the scenario for practicality.

Accordingly, for the Proposed Resource Management Plan, the acreage by age class and timber type scheduled for harvest in the first decade was randomly depleted in average harvest unit quantities from across the available land-use allocations and inventory to estimate the effects of harvest.

Due to unforeseeable events and adjustments made in site-specific planning, actual timber sale and management plans will differ from the ten-year scenarios. The scenarios provide an analytical tool, however, to help provide more specificity to analysis of impacts of the alternatives. Actions (such as timber sales) implementing the planning decisions will be analyzed before implementation to determine if impacts addressed in the environmental impact statement might differ significantly from those predicted based on the ten-year scenarios.

## Ten-Year Development Scenarios

Ten-year scenarios of expected mineral exploration and development activity have been developed and are set forth in Appendix N. An application has been filed by the City of Klamath Falls to construct a hydroelectric project on the upper Klamath River in

the planning area, and the Federal Energy Regulatory Commission has analyzed the proposal project, and alternatives, in an environmental impact statement (Federal Energy Regulatory Commission 1990). This development scenario is reasonable and foreseeable, and is set forth, with potential effects, in Appendix N. The information in this Appendix is excerpted from the Federal Energy Regulatory Commission Environmental Impact Statement. The City of Klamath Falls has submitted a new Salt Caves Project Proposal to the Department of Environmental Quality. The new proposal for the Salt Caves hydroelectric project will be analyzed for effects when that proposal is submitted to the BLM with a Right-of-Way grant application.

Preliminary permits to evaluate the feasibility of several pumped-storage hydroelectric projects located on Bryant and Stukel mountains have been issued by the Federal Energy Regulatory Commission. A general description of the projects are included in Appendix N. The effects of the proposal are not currently known, but would be identified in a future environmental impact statement to be completed by the Federal Energy Regulatory Commission, with BLM participation, prior to issuance of a license and right-of-way grant authorizing construction. The right-of-way exclusion/avoidance criteria would apply, as well as the management direction decisions for the other resources in this plan. The actual decision to approve or deny these projects will not be made until appropriate environmental documentation is completed.

## Mitigation

Mitigation is important in the design and implementation of the alternatives. In general, mitigation is a measure taken to cause an action to become less harsh or severe. From the Council of Environmental Quality regulations (40 Code of Federal Regulations 1508.20), mitigation includes:

- ◆ Avoiding the effect altogether by not taking a certain action or parts of an action;
- ◆ Minimizing effects by limiting the degree or magnitude of the action and its implementation;
- ◆ Rectifying the effect by repairing, rehabilitating, or restoring the affected environment;
- ◆ Reducing or eliminating the effect over time by preservation and maintenance operations during the life of the action; and
- ◆ Compensating for the effect by replacing or providing substitute resources or environments.

In the design of alternatives and throughout the discussion of environmental consequences in this chapter, mitigating measures have been incorporated and evaluated. For the actions analyzed in this Resource Management Plan/Environmental Impact Statement, mitigating measures are addressed primarily through land allocations and management practices and standards as described in Chapter 2.

Some examples of mitigating measures built into the design of the alternatives and identified in Chapter 2 are as follows:

- ◆ Selection and timing of timber harvesting techniques to minimize soil damage.
- ◆ Design and timing of prescribed burns to minimize effects on soils, wildlife habitat, and air quality.
- ◆ Large tree retention.
- ◆ Application of best management practices for watershed management, as described in Appendix F.
- ◆ Elk forage seeding when needed.
- ◆ Exclusion of livestock grazing from riparian zones where such exclusion is considered important to maintenance or recovery of riparian vegetation.

## Effects of Alternatives

Analysis of the alternatives is based on their different levels of planned activities (management activities), as shown in Chapter 2, and as summarized in Table 2-1.

## Effects on Global Climate

Many scientists anticipate noticeable global warming during the 21st century. There is substantial scientific uncertainty, however, about the rate of such warming. A report of the Intergovernmental Panel on Climate Change said temperature increases could be as low as one degree centigrade or as high as five degrees centigrade by the year 2100 (Schneider 1991).

The primary factors leading to the expectation of warming are substantial increases in atmospheric carbon dioxide, nitrous oxide, methane, chlorofluorocarbons, and other trace gases attributed to human activity. The BLM's land-management activities in the

planning area would primarily only affect the amount of carbon dioxide in the atmosphere. Forecasts of global carbon dioxide increases suggest that it could double from the level of the year 1900 sometime between the years 2030 and 2080 (Schneider 1989). However, this plan's alternatives would have only a slight effect on increased atmospheric carbon dioxide levels.

A key factor in assessing the effect of timber harvest and forest regrowth on the amount of carbon in the atmosphere is the amount of carbon stored within the trees of the forests. One analysis shows that forests managed on rotations of less than 100 years would store less than half the amount of carbon stored in old growth stands (Harmon et al. 1990), leaving more carbon in the atmosphere. Analysis by Harmon et al. indicated that about 42 percent of timber harvested in the northwestern U.S. would enter long-term storage in structural products (for example, construction material), while paper production would result in a larger release of carbon dioxide into the atmosphere. Commentors on the analysis by Harmon et al. (1990) have suggested that some factors relevant to assessing the effect of timber harvest levels on global climate were apparently not considered in the analysis, so it overstates the effect of such harvests. These factors include: the slow decomposition of products entering landfills, possible emission increases if fossil fuels are burned in lieu of wood or wood products, and emissions associated with substitution of alternative construction materials for wood or substitution of wood from virgin forests outside the northwestern U.S.

The calculations of Harmon et al. (1990) indicate that for each million acres of old growth forest harvested in the northwestern U.S., carbon would be added at less than one-tenth of one percent of the total carbon currently in the atmosphere. The largest acreage of old growth and mature forest anticipated for harvest within the first ten years of the plan for any alternative is 11,400 acres in the Alternative No Action. The Proposed Resource Management Plan would harvest 3,200 acres of old growth and mature forest. Although young, fast-growing trees store less carbon in total, they absorb more carbon from the atmosphere than older trees. Fertilization, vegetation management, and planting genetically selected stock all enhance this effect. In mature and old growth stands, release and absorption of carbon dioxide tends to be in balance; however logging, especially clearcutting, increases the rate of decomposition of debris on the forest floor, releasing more carbon dioxide. In the absence of timber harvest, over time wildfires would have similar effects on carbon release, but of a lesser magnitude. Only when a young stand reaches the

stage of *canopy closure* does its carbon uptake offset the release from decomposition (Alaback 1989).

One forest practice directly contributing carbon dioxide to the atmosphere is prescribed burning after timber harvest. In the absence of burning, however, the decay of the same wood over many years would contribute a similar amount of carbon dioxide. The largest amount of prescribed burning anticipated during the life of the plan in any alternative (Alternative E) would be 2.76 million tons of fuel (see Effects on Air Quality discussion), while under the Proposed Resource Management Plan, approximately 1.02 million tons of fuel would be burned. These levels of burning would contribute a maximum of 4.14 million tons and 1.53 million tons of carbon dioxide to the atmosphere, respectively (burning a ton of fuel could create up to 1.5 tons of carbon dioxide as the released carbon combines with oxygen). In the long term, a managed forest would have a balanced release and absorption of carbon dioxide, as would an unmanaged forest. Given that half of newly injected carbon dioxide would remain in the atmosphere (Schneider 1989), a decade of harvest in some older forests and prescribed burning under the preferred alternative could add 0.000088 percent to the carbon in the world's atmosphere, an unavoidable adverse effect.

The cumulative effects of BLM activities under the Proposed Resource Management Plan and similar activities proposed or anticipated on other forest lands in western Oregon and Washington for the expected ten-year life of the resource management plan, would add an estimated 100 million tons of carbon dioxide to the world's atmosphere, increasing carbon there by .01 percent. This includes 60 million tons from old growth timber harvest indicated by the Proposed Resource Management Plan in Oregon districts and by the US Forest Service under the Supplemental Environmental Impact Statement Record of Decision, and as much as 40 million tons from prescribed forest management burning by all landowners as controlled by the ceilings established in the Oregon Smoke Management Plan and the Washington State Smoke Management Plan. The effect on global climate would be slight. Total increases in atmospheric carbon dioxide from all worldwide sources, by comparison, are occurring at a rate of almost one-half percent annually (Trexler 1991). For further discussion on Analytical Assumptions about Global Climate Change see Appendix T.

## Summary

All of the alternatives would have some type of minor effects on the global climate. The Alternative No Action would have the highest probable sale quantity for timber harvests, but a moderate level of prescribed fire emissions. Alternative A would have a high probable sale quantity, but low fire emission level. Alternative B would be similar to Alternative A, but with lower levels for both the probable sale quantity and fire emission levels. The probable sale quantity for Alternative C would be lower than Alternative B, but fire emission levels would be higher than for Alternative A. The probable sale quantity for Alternative D would be slightly higher than for Alternative C, but the fire emission levels would be much higher than Alternative C. Alternative E would have the lowest probable sale quantity, but the highest fire emission levels. The Proposed Resource Management Plan would have a similar probable sale quantity and fire emissions levels slightly higher than Alternative C.

## Effects on Air Quality

Major sources of air pollutants associated with BLM resource management activities are smoke from prescribed burning, application of herbicides used to control unwanted vegetation, and dust from use of unsurfaced roads and road construction and maintenance. The effects associated with herbicide use can be found in the Final Environmental Impact Statement for Western Oregon-Management of Competing Vegetation to which this Resource Management Plan/Environmental Impact Statement is tiered (see Appendix 1-D in the draft).

Dust from new road construction and maintenance of older unpaved roads normally settles within a short distance from the point of origin. It has a negligible effect away from the construction and maintenance sites. Dust associated with road use also has negligible effect away from unpaved roads. Localized effects from road dust would be felt by residents within the rural interface area for all alternatives. The major adverse effect would be local and during the summer months when dust is produced from both public and administrative use of unpaved roads.

Prescribed burning is the only resource management activity proposed under any alternative that could have a notable adverse effect on local air quality. The effect of smoke from prescribed burning would either reduce visibility within a project area or under

adverse meteorological conditions could concentrate the smoke around the project site.

Under all alternatives, prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan and the Visibility Protection Plan. The focus of the effects by alternatives is on PM 10 (particulate matter smaller than 10 micrograms per cubic meter) because these emissions from prescribed fire are the criteria pollutants that could have the greatest impact on nonattainment areas and rural residents. In addition to wildland prescribed fire, typical sources of PM10 include industrial processes, woodstoves, roads, agricultural practices, and wildfires.

## Projected Emissions

Historically, annual post forest management slash treatment levels have varied between 0 to 40 percent of the total harvested acres. Air quality restrictions and prescribed fire prescription parameters have not curtailed operations in past years, but may limit or restrict future prescribed burning. Wildfires will occur without regard for human control. Estimates of the expected annual acreage of prescribed fire use were calculated. Broad assumptions regarding the ecological need for prescribed burning, the hazard reduction that might be necessary for risk management, and the amount of prescribed burning necessary for site preparation and other silvicultural treatments were made at this planning level. These estimates are very generalized because many assumptions about the level of prescribed fire use for each land allocation within the resource area cannot be validated until watershed analyses are completed.

Species mitigation measures (including habitat enhancement) within the matrix may sometimes restrict the use of prescribed fire on a site-specific basis, but are generally expected to only slightly reduce the use of fire. Thus, air quality analyses at the landscape/watershed planning levels, are critical in determining the actual amount of prescribed fire that may be needed on the landscape.

The amount and type of prescribed burning projected under all alternatives, except the Alternative No Action, represents a shift in emphasis compared to historical uses of prescribed fire. In the past decade, the majority of prescribed burning has consisted of pile burning of logging slash for site preparation and underburning for hazard reduction. These historical uses of prescribed fire are maintained and emphasized in Alternatives No Action, A, and B. Use of broadcast burning to meet silvicultural objectives would be a part of all alternatives, while Alternatives

C, D, E, and the Proposed Resource Management Plan use a combination of under-canopy and broadcast burning to meet the fuel treatment objectives.

In Alternatives C, D, E, and the Proposed Resource Management Plan, prescribed burning emphasizes ecosystem processes restoration, habitat restoration and maintenance, and hazard reduction. In these alternatives much of the proposed burning would be underburning, in both natural and managed stands. Burning for hazard reduction and site preparation may frequently take place in stands with many more trees retained after harvest than in the recent past, necessitating changes in prescribed fire techniques. Burning piles of slash after harvest, or for hazard reduction, would be done during the most favorable emission dispersion conditions.

The shift in emphasis from broadcast burning to underburning has some inherent smoke management risks. Large areas may burn in mosaics with varying fire intensity and severity. While this mimics natural underburning, there are risks associated with retaining coarse woody debris; the likelihood for reburning as wildfires is increased, as is the possibility for a prescribed burn to escape the planned burn area. Consequently, the potential for additional, unanticipated emissions is also increased. Furthermore, costs associated with the need for rapid extinguishment of smoldering fuels may be high and the ability to meet this objective unrealistic in the Klamath Falls Resource Area.

A majority of the prescribed fire use would be scheduled primarily during the spring period *although summer and fall burning would occur and is expected to mimic natural fire*. Spring burning minimizes the amount of smoke emissions by burning when duff and dead woody fuel have the highest moisture content which reduces the amount of material actually burned. Broadcast and underburning would also be planned during the spring to reduce damage to the site from high intensity burning and to facilitate control of the units being burned. Control of prescribed fire becomes increasingly more difficult after May.

It is anticipated that by prescribed burning under advantageous weather conditions, subsequent wildfire emissions may be reduced due to a decreased amount of available fuel and a lowered risk of large-scale wildfire. The local impacts to residents in rural communities, nonattainment areas, and Class I areas may be reduced through the use of an active fuels management program that may include prescribed fire. Extensive wildfires frequently occur after



periods of drought, thus fuel consumption may be very high. Wildfires may allow smoke to enter Designated Areas as well as nonattainment areas, while prescribed fires are specifically designed and conducted to minimize both their emissions and impacts.

This air quality analysis focuses primarily on the impacts of particulate matter from prescribed burning because of the large quantities emitted from fires, the potential contribution of PM10 from prescribed and wildfires to concentrations above the PM10 standard, the major reduction of visibility caused by PM10, and the role PM10 plays as a carrier of other toxic pollutants.

### Emissions by Alternatives

All alternatives would have more PM10 emissions and impacts to air quality than the burning styles of the recent past management. For a description of the techniques used to estimate emissions in the Proposed Resource Management Plan, see the Air Quality Analysis in the Final Supplemental Environmental Impact Statement.

Oregon has an established emission reduction goals for Total Suspended Particulate emissions from prescribed burning. The goal calls for a 50 percent reduction in these emissions by the year 2000. Therefore, with proper management it appears that fire use in the future will not compromise the ability of the State to reach prescribed burning emission reduction goals.

Prescribed burning under all alternatives is not expected affect visibility within *Crater Lake National Park* and *Gearhart Mountain Wilderness* during the visibility protection period (July 1 to September 15), because prescribed burning would rarely be conducted in the planning area during this period.

Prescribed burning emissions, under all alternatives, is not expected to affect annual PM10 attainment within the Klamath Falls nonattainment area (see Chapter 3 for discussion). Any smoke intrusions into these areas from prescribed burning are anticipated to be light and of short duration.

The greatest potential for smoke intrusions into the nonattainment areas would come from wildfire events followed by the underburning activities proposed under all alternatives, including the Proposed Resource Management Plan. Alternatives No Action and A would have less potential because of the lesser amounts of burning that would be accomplished through underburning, alternative treatments (hand pile and manual

treatment), and the no treatment option which would increase wildfire severity and dimension. Even though the risk of an intrusion is greater during underburning, the severity is less because the level of emissions and the amount of fuel burned during each event is reduced compared with wildfires.

Underburning emissions would average between 5 and 40 tons for each acre burned while emissions from broadcast and pile burning (both hand and tractor) would average between 1 and 30 tons for each acre burned. The difference in emissions is due to the higher burning intensities needed for broadcast burning and the increase in burning efficiency when material is piled and burned. In addition, further reductions in level of emissions from underburning could be accomplished by rapid mop up of the burned area immediately after ignition. Smoldering can be responsible for up to 90 percent of the total PM10 emissions produced.

Total smoke emissions and a greater chance for intrusions from improper planning and implementation of prescribed burning would be the highest under Alternative E and the Proposed Resource Management Plan followed by the other alternatives and the lowest under Alternative No Action. The amount of underburning would increase for Alternatives B, C, D, E, and the Proposed Resource Management Plan compared to the base period; while total emissions would be less, the potential risk of smoke intrusions may increase.

If little or no prescribed burning occurred in rural interface areas under Alternatives D and E, short term adverse visibility impacts and risk of smoke intrusions into the residential areas would be avoided. However, there would be an accumulation of fuel, and resultant increased risk of stand replacement wildfire, which would have the potential to affect both wildfire emissions as well as to inflict property and resource damage.

### Conclusions

Current avoidance strategies for prescribed fire assume that smoke can be vectored from the project site away from some sensitive areas and dispersed and diluted by transport winds. This process has been used very successfully for underburning in the resource area (as proposed under all alternatives and the Proposed Resource Management Plan). Underburning requires a low intensity burn that would not have the energy to lift (as in broadcast burns) the smoke away from the project site. Smoke retained on



site could be transported into portions of nonattainment areas if it is not dispersed and diluted by anticipated and correctly assessed weather conditions. Localized concentration of smoke in rural areas away from nonattainment areas could continue to occur during prescribed burning operations.

All alternatives except the No Action are projected to result in higher total PM<sub>10</sub> smoke emissions as well as greater chance for intrusions from prescribed burning. The Alternative No Action would produce the lowest level of emissions and least risk of smoke intrusions, however it would increase the risk of intrusions from wildfire. All alternatives except No Action would increase the amount of underburning compared to the base period. While emissions would be less, the risk of these lighter intrusion would increase under these alternatives.

## Effects on Soil Resources

### Introduction

Long-term soil productivity is the capability of soil to sustain the inherent, natural growth potential of plants and plant communities over time. Most land uses ultimately depend on a productive soil resource. Maintenance of long-term soil productivity is widely recognized as a basic requirement of land management. The extent to which this productivity is affected by management activities is not precisely known because investigations of these effects have only recently begun; however, it is known that some land management practices have the potential to reduce natural productivity if certain operating guidelines are not followed. Implementation of the management prescriptions (in Chapter 2) and best management practices in Appendix F will prevent unacceptable degradation of the soil resource.

The Timber Production Capability Classification identifies fragile sites that are judged to be incapable of supporting a sustained yield of forest products (fragile nonsuitable woodland category). No planned timber harvest will take place on these lands under any of the alternatives. Also identified are sites that are subject to unacceptable soil productivity loss as a result of management activities unless special restrictive or mitigation measures are used to protect them (fragile suitable restricted category).

Land management practices (including timber harvest, road construction, mining and off-highway vehicle use), can affect soil properties and productivity.

Some types and degrees of disturbances created by land management practices are considered acceptable while others are detrimental to long-term soil productivity. The extent of soil disturbance depends on numerous factors. Soil type and condition, the type, areal extent and intensity of disturbance, topography, and whether complete implementation of planned practices and mitigation measures was obtained contribute to the degree of disturbance and resultant effects. Detrimental effects can be avoided or ameliorated, and long-term productivity can be maintained if adequate soil management practices are planned and implemented. The most common types of disturbances affecting soils and associated long-term productivity in the planning area are compaction, displacement, erosion, and alteration of nutrient status. Appendix S contains more detail and discussion on each of these disturbance types. Discussion of the effects of the alternatives and the Proposed Resource Management Plan on the soils resource is organized by disturbance type, except for mineral exploration and development, which is discussed below.

Mineral exploration and development has the potential to negatively affect soils in a variety of ways. Appendix N describes in detail the reasonably foreseeable development scenarios for leasable, locatable, and salable minerals. These scenarios are summarized in terms of their effects on soil resources. Exploration and development of leasable minerals (oil, gas, and geothermal) will cause varying degrees of soil erosion and compaction from construction of roads, pads and facilities, and pipeline trenching. Stockpiling of topsoil may also occur, which can reduce soil fertility. Activities associated with locatable mineral exploration and extraction also have the potential to negatively affect soil resulting in gullying, compaction, and displacement. Up to 150 acres may be affected by leasable mineral activity, 5 acres by locatable mineral activity, and 60 acres from salable mineral activity during the life of the plan.

### Compaction and Displacement

Soil compaction is of concern due to the potential for reduced soil productivity in compacted areas. Studies have shown that compacted soils can have characteristics that are generally considered unfavorable for plant growth. These characteristics include high bulk density and reduced porosity, aeration, and drainage (Adams and Froehlich undated). Root penetration and growth is often decreased in soils of high density. Supplies of air, water and nutrients to plant roots can be adversely changed by compaction through decreased soil porosity and drainage.

Soil compaction can persist for decades, or it can be significantly reduced within a few years under favorable conditions (Adams and Froehlich undated). These conditions exist when soils contain active plant roots or organisms and/or when soils are subjected to regular freeze-thaw and wet-dry cycles (Adams and Froehlich undated).

Timber harvest and site preparation methods combined with soil conditions existing during these activities influence the degree of soil compaction and displacement that occurs. Because tractor logging requires a network of skid trails over an entire unit, soil disturbance, including compaction and displacement, can occur over relatively large areas. Cable yarding systems cause considerably less soil disturbance than tractor yarding. However, during cable yarding logs can gouge and displace soil, which can cause a concentration of runoff with subsequent erosion and reduced productivity. Helicopter systems cause less soil disturbance than cable yarding and use fewer roads, but can result in larger landings, which are vulnerable to erosion.

Detrimental soil compaction occurs at depths greater than two inches and is evidenced by: an increase in soil bulk density of 15 percent or more over the undisturbed level and/or a macropore space (pores over 0.038 millimeters) reduction of 50 percent or more (BLM 1988a). Detrimental soil compaction caused by tractor yarding has been shown to reduce soil productivity in proportion to the area compacted. Furthermore, uneven-age harvest methods generally result in a greater portion of an area in skid trails and landings and more trips over time along those trails than other treatments. Unrestricted tractor yarding can cause detrimental compaction in 25 percent of a harvest unit. Using designated skid trails can reduce detrimental compaction to 12 percent of a unit and use of cable yarding with partial suspension to three percent. The best management practices in Appendix F are designed to further restrict the amount of detrimental soil compaction resulting from timber management activities.

In all of the alternatives, the majority (approximately 90 percent) of acres in the planning area to be harvested will use ground-based yarding systems. Cable systems with at least partial suspension will be used on approximately eight percent, and cable systems with full suspension will be used on the remaining two percent of harvested acres. On the west side 9,590 acres (19 percent of the total land area) and 3,020 acres on the east side (1.8 percent of the total land area) are expected to be included in timber harvest units during the next 10 years in the

Proposed Resource Management Plan. Table 4-1 summarizes estimated acres of harvest for all of the alternatives.

Tractor piling can also cause displacement and detrimental compaction of the soil resource. Effects vary with the amount of material to be piled, soil moisture, depth of organic matter and A horizon of the affected soil(s), whether an area has been previously affected by yarding activities, and the skill of the person operating the machinery. Mechanical site preparation is scheduled to be 2,470 acres in the Proposed Resource Management Plan and ranges from a high of 5,000 acres during the life of the plan under Alternative No Action to a low of 380 acres under Alternative E (see Table 4-1).

Livestock grazing can cause soil compaction where livestock are concentrated, such as around water sources or salt licks. Soil compaction can reduce the rate of water infiltration and increase soil bulk density. The type of grazing management system used can be of more importance to these areas than total livestock numbers; however, the risk of soil damage is greater when livestock numbers increase. The intensity and duration of grazing determines the extent to which the soil is affected. One study of water infiltration (Anderson 1993) as related to the degree of forage utilization found that infiltration rates on lightly grazed range land were 2.5 times higher than on heavily grazed range land and 1.8 times higher than that on moderately grazed range land. Another study showed that bulk densities (a measure of compaction) were higher for soils subjected to heavy grazing than for soils under light grazing (Anderson 1993). In the Proposed Resource Management Plan and Alternatives C, D, and E, the establishment of different seasons of livestock grazing use and, in some instances, reductions in livestock numbers will have a positive effect on soil productivity.

Recreational activities in the planning area cause compaction and displacement; however, these effects are expected to be minor. Concentrated recreational use will compact soils and channel runoff in these areas, although maintenance of trails and rehabilitation of damaged areas will help to reduce negative effects. Alternatives A and B have the highest risk of soil displacement and compaction, because in these alternatives nearly all lands in the planning area are open to off-highway vehicle use. The risk of adverse effects decreases in the Proposed Resource Management Plan and Alternatives No Action, C, D, and E, because of the larger acreage of lands either closed to off-highway vehicle use or open to off-highway vehicle use with increased restrictions.

Table 4-1. Estimated Annual First-Decade Levels of Timber Management Activity by Alternative

Activity <sup>1</sup> (acres except as noted)	Alternative						
	NA	A	B	C	D	E	PRMP
West Side							
Final or regeneration harvest							
Harvest unit acres <sup>2</sup>	1,610	927	885	56	1,003	77	131
(TRIM*PLUS harvest acres) <sup>2</sup>	95	(547)	(461)	(31)	(444)	(35)	(61)
CT/density/uneven-age mgmt.	See Footnote 3						
Harvest unit acres <sup>2</sup>	290	163	155	424	177	13	828
(TRIM*PLUS harvest acres)	See Footnote 3	(96)	(81)	(238)	(78)	(6)	(385)
Road construction (miles)	1.6	1.0	1.2	0.65	1.3	0.02	1.0
Road construction (acres)	17.4	10.9	13.1	7.1	14.2	0.2	11
Ground-based yarding	1,785	993	975	460	1,110	83	862
Cable yarding, no suspension	0	0	0	0	0	0	0
Cable yarding, partial suspension	95	32	65	20	70	7	73
Cable yarding, full suspension	20	(65)	0	0	0	0	24
Broadcast burn	36	0	0	0	0	0	0
Mechanical pile and burn	300	297	238	119	208	23	178
Hand pile and burn	3	3	2	1	2	1	2
Brushfield/hardwood conversion	0	40	35	20	35	0	0
Planting/regular stock	1,005	529	529	160	300	40	300
Planting/genetically selected	200	100	100	40	100	10	100
Vegetation control	189	346	300	200	280	200	200
Animal damage control	148	800	750	500	600	500	400
Pre-commercial thinning	220	58	50	20	40	10	50
Fertilization	639	40	34	31	31	1	32
Pruning	0	18	16	11	11	0	16
Probable sale quantity (mmbf) <sup>4</sup>	19	13.8	11.8	4.5	9.6	1.0	5.9
Probable sale quantity (mmcf) <sup>4</sup>	3.423	2.483	2.103	.791	1.674	.82	1.026
Miscellaneous volume (mmbf) <sup>5</sup>	N/A	N/A	N/A	N/A	N/A	N/A	.6
Miscellaneous volume (mmcf) <sup>5</sup>	N/A	N/A	N/A	N/A	N/A	N/A	.103
East Side							
Final or regeneration harvest	60	60	58	53	58	1	33
CT/density/uneven-age mgmt.	540	564	524	474	522	8	269
Road construction (miles)	1.6	1.6	1.2	1.4	1.5	0.1	.7
Road construction (acres)	17.4	17.4	13.1	15.3	16.4	1.1	8
Ground-based yarding	560	584	542	492	540	9	282
Cable yarding, no suspension	0	0	0	0	0	0	0
Cable yarding, partial suspension	40	40	40	35	40	0	20
Cable yarding, full suspension	0	0	0	0	0	0	0
Broadcast burn	0	0	0	0	0	0	0
Mechanical pile and burn	200	198	158	79	139	15	69
Hand pile and burn	3	2	2	1	1	1	1
Brushfield/hardwood conversion	0	40	20	20	30	0	0
Planting/regular stock	120	125	116	105	116	2	60
Planting/genetically selected	30	31	29	26	29	0	15
Vegetation control	0	33	25	25	25	0	25
Animal damage control	0	25	20	15	20	15	15
Pre-commercial thinning	50	20	15	15	15	0	20
Fertilization	0	0	0	0	0	0	0
Pruning	0	15	15	12	12	0	13
Probable sale quantity (mmbf) <sup>4</sup>	1.4	1.38	1.29	1.17	1.26	0.021	0.40
Probable sale quantity (mmcf) <sup>4</sup>	0.270	0.267	0.249	0.226	0.248	0.004	0.078
Miscellaneous volume (mmbf) <sup>5</sup>	N/A	N/A	N/A	N/A	N/A	N/A	0.04
Miscellaneous volume (mmcf) <sup>5</sup>	N/A	N/A	N/A	N/A	N/A	N/A	0.008

**Table 4-1. Estimated Annual First-Decade Levels of Timber Management Activity by Alternative (continued)**

<sup>1</sup> Estimates are derived from ten-year Representative Timber Management Scenarios.

<sup>2</sup> See Appendix G for explanation of the difference in acres between actual harvest unit acres and TRIM\*PLUS harvest acres.

<sup>3</sup> The Alternative No Action did not have Trim harvest acres.

<sup>4</sup> The probable sale quantity in the Proposed Resource Management Plan shown may vary by plus or minus 40 percent due to changes resulting from further land classification, stream inventory, and watershed analysis. The acres associated with harvest activities may also vary by plus or minus 40 percent.

<sup>5</sup> Miscellaneous volume is Proposed Resource Management Plan harvest volume resulting from treatments made in lands not allocated to forest management /timber production. An example is thinning for stocking control in Riparian Reserves, to achieve Aquatic Conservation Strategy objectives.

Due to unforeseeable events and adjustments made in site-specific planning, actual timber sale and management plans will differ from the ten-year Representative Timber Management Scenarios. The scenarios provide an analytical tool, however, to help provide more specificity to analysis of effects of the alternatives. Actions (such as timber sales) implementing the planning decisions would be analyzed before implementation to determine if effects addressed in the environmental impact statement (for example, effects to water quality in the analytical watersheds) might differ significantly from those predicted based on the Representative Timber Management Scenarios. For analysis purposes, it was assumed that all harvest units in any watershed could be logged within any five-year period.

Analysis of the alternatives is also based on their different levels of planned activities as shown in Table 2-1.

Abbreviations used: CT = Commercial thinning; PRMP = Proposed Resource Management Plan; N/A = Not Applicable

Juniper management activities can cause compaction and displacement if heavy machinery is used (for example, chaining, bulldozing, or mechanical harvest). If watershed condition improvement is an objective of a particular juniper management project, then the use of heavy machinery will have additional restrictions.

## Soil Erosion

Natural surface erosion rates in undisturbed soils in the planning area are low to moderate. Surface runoff generally does not occur if a protective cover of vegetation, duff, rock and litter is present; however, if the soil is exposed and the infiltration rate of the soil is reduced by compaction, then surface runoff can occur. Compacted soils cannot absorb water fast enough during heavy rains to prevent runoff, which can cause rills and gullies. Eroded soil may move only a short distance and be re-deposited on-site, with minimal effect on long-term soil productivity, although if the erosive force is great enough, then it may be carried off-site and into streams as sediment, which can affect long-term productivity. In general, any soil loss is considered to have a negative effect on long-term soil productivity because soil nutrients, water supplying capacity, rooting depth, and lateral rooting will be reduced. Productivity was not analyzed due to the lack of data that relates surface erosion to soil productivity; however indications show that topsoil removal will negatively affect productivity.

Land management activities, especially road and landing construction, log yarding, prescribed burning, tractor piling, livestock grazing and off-highway vehicle use can accelerate surface erosion processes by creating exposed and/or compacted soil. Practices

in Chapter 2 and the best management practices in Appendix F will prevent or minimize compaction, exposure, and erosion of soils.

Recreational activities, such as off-highway vehicle use, can result in increased erosion where soil cover is removed or when activity occurs during wet soil conditions. Limiting off-highway vehicle use in the Proposed Resource Management Plan and Alternatives C, D, and E can decrease erosion of currently used roads and other sites.

Erosion can occur on roads that are inadequately surfaced or drained, or are used during wet soil conditions. Erosion from roads is generally minor in the planning area due to gently sloping topography; however, due to the number of existing roads per square mile, the risk of soil erosion is enough to be of concern. Roads adjacent to streams are the greatest cause for concern, due to the higher potential of sediment being transported into these areas. Road construction in the resource area during the life of the plan will be approximately 17 miles in the Proposed Resource Management Plan and varies from a high of 32 miles in Alternative No Action to a low of 1 mile in Alternative E. Reduction of soil erosion from roads will be a focus of watershed analysis and watershed restoration. Road densities in Key Watersheds will not increase during the life of the plan, and will be decreased where feasible to do so.

Heavy utilization and trampling by livestock can remove protective vegetation, thus increasing the risk of surface erosion. Livestock grazing will be managed to obtain moderate utilization levels and to maintain a protective stubble and residue cover on



the soil. Range and watershed improvement projects, such as juniper thinning and brush control, can have short-term negative effects, yet have overall positive effects on soils by improving soil cover conditions.

Landslides affect less than one percent of the planning area's land base. Landslides can cause off-site effects, which in turn can have major effects on water quality and fish habitat. The long-term productivity of the site where a landslide occurs will be significantly affected. Certain lands in the Timber Production Capability Classification fragile category have been identified as areas with soils that are prone to landsliding or surface erosion. Alternatives that allow the most acreage of timber harvest or allow a greater percentage of trees to be removed from areas classified as fragile slope gradient and fragile mass movement have the most potential for increasing the natural rate of landslides. No lands in the Timber Production Capability Classification fragile category are planned for harvest in the Proposed Resource Management Plan.

Timber harvest, site preparation and prescribed burning will be conducted so as to minimize the area of bare soil resulting from these activities (see Appendix F). Proposed seeding of harvested acres for wildlife forage will positively affect soil cover conditions.

## Nutrient Status

Because of the interdependence between above-ground organic matter supplies and soil nutrient cycling and availability, management of the surface organic material strongly influences soil productivity. Decaying plant components, including large down woody debris, produce an organic layer on the soil surface that decomposes into soil organic matter. Soil microorganism activity has been directly linked to soil productivity (Harvey et al. 1979). Nitrogen is a limiting growth nutrient in many Pacific Northwest sites, and the surface organic layer (duff) is a primary source of nitrogen for tree growth.

Harvest intensities and frequencies that remove the most organic material have the greatest potential for decreasing long-term soil productivity; similarly, high intensities and frequencies of site preparation (such as high intensity, long duration fires; and "clean" mechanical piling) potentially have the greatest effect. Harvest and site preparation activities in the Proposed Resource Management Plan will be designed to avoid or minimize soil damage (see Chapter 2 and the best management practices in Appendix F). The most direct indicator of relative risk for decreases in

soil productivity from reductions in organic matter among alternatives are the differences in management practices used and acres harvested, as well as site preparation methods; however, if proper soil management practices are used as planned, soil organic matter and related long-term soil productivity should be insignificantly affected in the Proposed Resource Management Plan and all alternatives. Implementation of best management practices will have a positive effect on soil resources by establishing standards for retention of woody debris and of soil surface cover.

Fire significantly affects soil productivity because organic matter located on or near the soil surface is rapidly burned. Although some nutrients are volatilized and lost to the atmosphere, some nutrients are made more available with fire. This is because fire acts as a rapid mineralizing agent that releases nutrients instantaneously as contrasted to natural decomposition processes, which may take years or even decades (Debano 1990). Fire has played an important role in the nutrient dynamics of soils in this region. Prescribed fire in the Proposed Resource Management Plan will be designed to bring back this natural part of the ecosystem at levels appropriate to the site and decrease the intensity and severity of wildfires. Wildfire generally results in magnified short- and long-term effects on soil productivity compared to those from prescribed burns. Prescribed burning will be avoided on highly sensitive soils, in most instances. On other soils, fire prescriptions will be designed to protect beneficial soil properties and result in moderate and low intensity burns (see Chapter 2 and Appendix F). Ground cover retention requirements and the retention of woody debris on site will minimize short-term effects and minimize or prevent long-term and cumulative effects on soil productivity. Hot burns will occur in limited portions of prescribed fire units because of localized heavy fuel loads. These areas will experience short-term (3 to 5 years) reductions in surface organic matter that may otherwise be decomposed into soil organic matter and provide protection to the soil surface. Hot burns will also cause reductions in plant nutrient supply, energy supply to microorganisms, and water storage capability and will increase the soil's susceptibility to erosion.

Juniper treatment can result in either increased or decreased nutrient availability. Juniper can store significant amounts of nutrients in its foliage. If junipers are burned, then many of the nutrients can be lost to the atmosphere through volatilization. If juniper are harvested and little biomass remains on site, then there will be a net reduction in nutrients. If



juniper are cut and the branches lopped and scattered, then the nutrients tied up in the foliage will slowly be released during decomposition.

Fertilization can be used to enhance growth on well-managed sites or to help restore growth on sites where practices have reduced productivity by significantly reducing nutrient status. However, fertilization is not a substitute for excessive organic material removal from a site and will not be a planned mitigation. Fertilization also reduces tree shock and stress after thinning. Fertilization is proposed both as a timber management treatment (under all alternatives) and as a forest condition restoration treatment (under the Proposed Resource Management Plan). In the Alternative No Action, the largest area (640 acres) would be fertilized annually. The Proposed Resource Management Plan would fertilize approximately 220 acres annually, including 190 acres of treatment intended mainly to reduce shock in stands thinned to improve health. There is little difference among the other alternatives (A, B, C, D, and E) in the number of acres that would be fertilized (from 1 to 40 acres annually).

## Summary

Decreases in the number of acres available for timber harvest and site preparation in the Proposed Resource Management Plan and Alternatives A, B, C, D, and E compared to present levels (Alternative No Action) will decrease soil productivity losses resulting mostly from compaction, displacement, and erosion associated with forest management activities. Limiting the extent of detrimental soil conditions outlined in Appendix F will result in a net positive effect on soils.

Adverse effects on long-term soil productivity will be similar and minimal for the Proposed Resource Management Plan and Alternatives A, B, C, D, and E with successful implementation of best management practices (Appendix F) and practices listed in Chapter 2. The Alternative No Action has the greatest risk of producing adverse effects due to the number of acres being harvested by tractors, the amount of forage allocated for livestock and associated seasons of use, and the lack of some best management practices and practices that apply to the Proposed Resource Management Plan and the other alternatives. The greatest risk of adverse effects from grazing will be for Alternatives No Action, A, and B, where forage production is emphasized. The Proposed Resource Management Plan and Alternatives C, D, and E will result in an improvement of soil conditions, due primarily to changes in season of livestock grazing use and improvements in soil cover conditions.

A major difference among the alternatives is the total acres harvested and acres of fragile sites that may be harvested. Timber harvest will occur proportionally on all soil types in the Proposed Resource Management Plan and all alternatives except Alternative E which proposes removing areas classified as fragile suitable restricted from the timber producing land base. The Alternative No Action, with the most acres available for timber harvest and site preparation, will have the most acres requiring implementation of management practices that will maintain long-term productivity; Alternative E will require implementation on the least amount of acres (see Table 4-1). Timber management activities can have adverse cumulative effects on soil through repeated entries to harvest timber, to dispose of logging debris, and to prepare sites for planting. In general, alternatives with higher levels of timber harvest will also have greater surface disturbance, greater risk of cumulative effects, and greater need for mitigation measures. Cumulative increases in compaction and corresponding decreases in soil productivity will occur with repeated entries associated with uneven age management. These cumulative effects will be minimized and mitigated to the extent possible through the application of best management practices. Most effects of compaction are confined on-site. However, off-site effects can occur from increased runoff due to compaction. These off-site effects include increased erosion and subsequent sediment input to streams. Timing of runoff can also be changed due to a greater portion of the runoff entering streams by surface flow rather than through the groundwater system. Although management prescriptions and mitigation measures have been designed to keep the extent and duration of adverse effects on soils within acceptable levels, adverse effects cannot be completely eliminated. The construction of rocky and/or excavated roads, quarries, and water impoundments, and soil erosion are irreversible or irretrievable commitments of soil resources.

## Effects on Water Resources

### Introduction

The interaction between hydrologic processes and watershed components (including geology, soils, and vegetative cover) is very complex and resource management activities contribute further complexity. Surface soil erosion, mass-wasting (landsliding), and channel scour are all naturally occurring processes that are accelerated by surface disturbance, removal of soil-anchoring vegetation, and concentration of

water caused by management activities. Appendix P discusses the interactions between land management activities and water quality in general as well as basic hydrologic principles. The Effects on Riparian-Wetland Areas and Effects on Soil Resources sections of this chapter also discuss effects that are interrelated with water resources. Management activities in the planning area that have the greatest effect on water resources are timber management with its associated transportation system and livestock grazing, while off-highway vehicle use, recreation, mineral exploration and development, and fire generally result in effects of lesser magnitude. The Proposed Resource Management Plan and each of the alternatives have the potential to affect water quality. Potential effects range from a risk of violation of state and federal water quality requirements (which will require mitigation) to overall improvements in water quality. Effects of management actions on water quantity and quality are direct, indirect, and cumulative. Direct and indirect effects resulting from the Proposed Resource Management Plan and the alternatives are described in the water quantity and quality sections. Cumulative effects that include past action and those on non-BLM lands are addressed in the watershed condition section.

The analysis of effects of the Proposed Resource Management Plan incorporates by reference the analyses and conclusions in the Final Supplemental Environmental Impact Statement regarding water resources. Alternative 9 of the Final Supplemental Environmental Impact Statement was essentially adopted in the Supplemental Environmental Impact Statement Record of Decision which, in turn, has been incorporated into the Proposed Resource Management Plan.

## Water Quantity

Removal of large areas of vegetation through timber harvest has the potential of increasing the timing and quantity of water runoff. Creating forest openings through timber harvest changes the aerodynamics of the vegetation, which can cause more snow to be deposited and accumulated on the soil surface. The magnitude of any change is the result of a variety of factors, including the intensity of the harvest, vegetation type, and physiographic and climatic conditions. Due to the extent of previous timber harvest activities (the majority of the commercial forest land in the resource area has been previously treated), it is likely that flow increases, if any, have already been realized in forests in the planning area. Because of this and the type of harvest that will occur (partial cuts in previously entered stands) in the Proposed Resource

Management Plan and the alternatives, there will likely be little or no potential for increasing annual water yield in these areas.

Soil disturbance associated with roads, landings, skid trails, and mechanical site preparation can cause hydrologic changes affecting the timing, volume, and quality of runoff. Infiltration and percolation through the soil can be reduced by compaction, removal of vegetation or as a result of hydrophobic soil conditions associated with intense burning. An increase in the volume of runoff delivered directly to stream systems increases the potential for damaging peak flows and subsequent stream channel scour and degradation. Increases in peak flows can decrease stability on marginally stable stream channels. Timber harvest areas and roads within the transient snow zone can contribute to increased peak flows associated with rain-on-snow events. Watersheds south of Highway 66 generally have the greatest acreage in the transient snow zone and, therefore, a higher potential for adverse effects.

Soil compaction and an extensive road network can cause some precipitation to enter streams as surface runoff rather than through the groundwater system, thus slightly decreasing the amount of water available to enter the aquifer. Groundwater aquifers tend to moderate the runoff cycle and stabilize stream flows, thus minimizing the potential for streambank damage and initiation of instability. Reduced infiltration and percolation rates associated with soil disturbance, particularly in or adjacent to riparian-wetland areas, can reduce the rate or quantity of groundwater recharge and the amount and duration of summer base flows. Roads can provide an effective drainage network for a watershed, which can cause water to leave as surface runoff through ditches. The potential of the Proposed Resource Management Plan or the other alternatives to adversely affect groundwater recharge and aquifer functioning will be small or negligible, because much of the planning area has already been affected by past management activities and the road network has mostly been built. The Proposed Resource Management Plan requires that, in Key Watersheds, no net increase in road mileage be allowed and existing road mileage should be reduced. This will have a net positive effect within these watersheds. In addition, with the emphasis on Watershed Restoration in the Proposed Resource Management Plan, it is likely that additional road density reductions outside of Key Watersheds will take place during the life of the plan. Watershed Analysis will provide site-specific information from which road management decisions will be based.

Large scale juniper treatment (such as cutting, burning, and chaining) has not occurred in the planning area, with the exception of the Willow Valley (in 1967) and Harpold (in 1970) chainings. Treatment of juniper is identified in the Proposed Resource Management Plan and the alternatives for watershed enhancement through improvements in ground cover conditions, and for range and wildlife habitat improvement. The variability in sites and a lack of knowledge about the interactions between surface and ground-water in the planning area makes the potential for increasing annual water yields from juniper woodlands uncertain. The treatment of juniper (whether it is cut, burned, or harvested), can have variable effects on water availability. Gains in water availability and water yield will only occur if the remaining vegetation intercepts and evapotranspires less water than the juniper-dominated community that existed prior to treatment (Pyke pers. comm. 1994). Other site-specific factors such as soil texture, slope, aspect, amount of bare soil and soil compaction will determine the net effects of treatment. Infiltration rates can be increased with juniper treatment upon the successful establishment of an herbaceous plant cover on the site after treatment. Some juniper treatment will be concentrated around spring areas where they compete with more desirable plants for available water and nutrients. Targeting of spring areas with small-scale juniper treatment has resulted in many cases in beneficial effects in the region. Each juniper treatment project will be designed to meet site-specific conditions and resource objectives, and treatment will be accomplished through a variety of means (cut-and-lie; cut, then lop and scatter limbs; burning; commercial harvest; and issuance of fire-wood/post and pole permits). If the objective of a particular juniper treatment project is improvement of watershed condition, then the use of heavy machinery will have additional restrictions.

Water use for management activities will be highest under those alternatives with the highest levels of livestock grazing, the most acres of prescribed fire and the most miles of road constructed, renovated or maintained. Conflicts between water use demands for management activities and use for wildlife and livestock will likely occur in the Proposed Resource Management Plan and all alternatives except E. Water needed for management activities may need to be transported long distances at high cost, particularly if drought conditions continue to persist in the planning area.

## Water Quality and Timber Management

Timber management activities, including timber harvest, salvage operations, slash treatments, and site preparation, can affect water resources in varying degrees through the alteration or destruction of vegetation, the compaction or disturbance of soil, and changes in sediment yield and water temperature. Consequences of these activities can include reduced infiltration rates, water channelization, overland water flow, and increased susceptibility of the soil to detachment and displacement. Table 4-1 displays the number of acres scheduled for timber harvest in each alternative. It is assumed that the greater the amount of timber harvested, the greater the ground disturbance and the greater the potential for soil displacement. Alternatives that include more acres of timber harvest and site preparation, such as Alternatives No Action, A, B, and D will have a higher sediment production risk and a higher risk of violating state water quality requirements; the Proposed Resource Management Plan and Alternatives C and E will have a lower risk. The Proposed Resource Management Plan and all of the alternatives will result in little sediment increase from timber management activities if best management practices are properly applied and implemented. Actual sediment levels are expected to be low in all alternatives and the Proposed Resource Management Plan due to the relatively flat topography, low erodibility of forest soils and low stream densities in the planning area.

The degree of risk for increased stream temperatures from timber harvests is related to the amount and intensity of timber harvest within riparian-wetland areas. The Final Supplemental Environmental Impact Statement concluded that Alternative 9 along with other Final Supplemental Environmental Impact Statement alternatives with the same Riparian Reserve scenario will have the least adverse effects to water quality. Based on Riparian Reserves and other components of the Aquatic Conservation Strategy, Alternative 9 (and thus the Proposed Resource Management Plan) is expected to maintain or improve water quality. The acres of Riparian Reserves in the Proposed Resource Management Plan are greater than any of the acres of Riparian Management Areas in the alternatives. Therefore, implementation of the Aquatic Conservation Strategy will result in effects that are less than those resulting from implementation of the alternatives discussed in the draft Resource Management Plan. Riparian Reserve guidelines in Chapter 2 and the best management practices outlined in Appendix F will protect



streams and riparian-wetland areas from effects due to management activities adjacent to them. Watershed Analysis and Watershed Restoration will focus on evaluating and treating existing water quality problems and will provide the basis for future management and protection of streams and riparian-wetland areas.

Long-term stability of the stream channel is dependent upon recruitment of large woody material from riparian-wetland areas. Large woody material (debris) provides stability to the channel by creating hydraulic controls and dissipating water energy. Successful implementation of the Aquatic Conservation Strategy and best management practices will help prevent adverse changes in the amount of large woody debris in streams flowing through BLM-administered lands. Alternatives A, B, C, and D will have the long-term effect of decreasing large woody debris in 1st order streams by removing future sources of large woody debris. Alternatives A, B, and C will have the same long-term effect on 2nd order streams. Intermittent streams will receive substantial protection in the Proposed Resource Management Plan under the Aquatic Conservation Strategy. This protection will result in long-term increases in large woody debris supply to first and second order streams, which are typically intermittent. The Proposed Resource Management Plan and all alternatives will have the long-term effect of increasing large woody debris in 3rd order and larger streams by retaining and protecting vegetation to provide future sources of large woody debris in riparian-wetland areas. The Watershed Restoration program may result in projects to restore large woody debris in systems where it has been lost and where its restoration is appropriate. In addition, silvicultural treatments may be applied in Riparian Reserves to restore and retain large conifers in these areas as future sources of large woody debris.

Timber management activities have a low risk of adversely affecting groundwater quality. The most significant potential effects on groundwater quality are from the use of chemicals. These include herbicides, insecticides, and rodenticides; fuels and oils used in by heavy machinery for logging and road construction/maintenance; fertilizers; and retardants used in fire control. With proper use there will be a low risk of adverse effects; the greatest risks to groundwater or surface water will come from accidental spills or incorrect use. The use of chemicals for vegetation management is discussed in the BLM's 1989 Vegetation Management Environmental Impact Statement. The use of fuel and oil and associated risk of effects to water resources is related to the level of timber

harvest activity and road construction/maintenance proposed in each alternative. Please refer to Appendix F for guidelines on chemical use.

## Water Quality and Roads

Roads account for a majority of sediment problems in the planning area and are often the links between sediment source areas (skid trails, landings, cutslopes) and stream channels. The major portion of the transportation system in the planning area has been completed, with most of the roads located on gentle slopes. Roads have been built that parallel streams and many have degraded the character of drainages and created erosion problems. These roads will be a high priority for maintenance, improvement, or closure. Closure of unneeded roads and roads causing environmental damage, as well as seasonal closures, will reduce the potential for adverse effects. Watershed Analysis and Watershed Restoration will provide the basis for evaluation of road-related sediment problems and will outline a treatment strategy for each area. In Key Watersheds, no net increase in road mileage will be allowed (within BLM's authority). Emphasis will be placed on reducing the existing road mileage within Key Watersheds and these watersheds will receive the highest priority for watershed restoration. Table 4-1 displays the total miles of road construction proposed on an annual basis for both the west and east side. It is assumed that the greater the amount of road construction, the greater the ground disturbance and the greater the potential for soil displacement. The level of effects from new road construction in the Proposed Resource Management Plan and all of the alternatives is expected to be low.

## Water Quality and Livestock Grazing

Without proper management, livestock frequently concentrate in riparian-wetland areas and overgraze available forage, which can decrease shade-producing vegetation, expose stream surfaces to solar radiation, and increase water temperatures. In addition, bank trampling and sloughing can make channel cross-sections wider and shallower. Nutrients and bacteria in animal waste can cause adverse effects on water quality. The risk of these effects occurring increases in those alternatives with higher animal unit months and longer seasons of use, because of the increased length of time in which livestock can graze in riparian-wetland areas. The potential for increasing low-flow water temperatures, decreasing dissolved oxygen, altering pH and for inputs of sediment, bacteria, and

nutrients to water resources will be higher for Alternatives No Action, A, and B, due to the emphasis on increased livestock use. The Proposed Resource Management Plan and Alternatives C, D, and E can result in improvements in low-flow water temperatures, in pH and dissolved oxygen and in sediment, bacteria, and nutrient levels. Flat water (reservoir) quality would be expected to act similarly to stream water quality from management actions proposed in the Proposed Resource Management Plan and alternatives. Implementation of appropriate livestock grazing systems can improve reservoir water quality by reducing sedimentation and turbidity. Vegetative cover around shorelines will reduce erosion from wave action and will filter overland flows. However, for some reservoirs in areas where the BLM does not have control over reservoir operation nor has much administration of the land in a reservoir's watershed (such as Stukel Mountain and Bryant Mountain), water quality conditions are expected to improve only slightly during the life of the plan.

Implementation of grazing systems based on guidelines in the Proposed Resource Management Plan that limit livestock grazing in riparian-wetland areas and establish site-specific seasons of use to allow for regrowth of vegetation will reduce adverse effects from livestock use in riparian-wetland areas. The goal of 75 percent or more of riparian-wetland areas obtaining proper functioning condition will be a primary focus of livestock management in the Proposed Resource Management Plan. Severe drought has slowed recovery of riparian-wetland areas where changes in livestock management have occurred. Also, adverse effects from management of privately-owned lands have impeded improvement of riparian-wetland area function on BLM-managed land.

Livestock grazing affects watershed function by alteration of vegetation cover and by soil compaction from the physical action of animal hooves. Reductions in vegetation cover can also increase the impact of raindrops, decrease soil organic matter, increase surface crusting, and decrease water infiltration rates. These effects can, in turn, cause increased runoff, reduced soil water content, and increased erosion (Environmental Protection Agency 1993). Adverse effects from livestock grazing are mostly related to the intensity of use; therefore, alternatives with increased numbers of livestock will have greater risk of effects. Guidance for management of uplands in the Proposed Resource Management Plan will provide protection for the hydrologic condition of uplands and subsequently, of water quality. Livestock will be managed to improve distribution and obtain moderate use of forage. Some areas of heavy

use will continue to occur around salt licks and water sources. Overall, upland conditions are expected to improve over the life of the plan, although improvement can be slowed if drought conditions continue. Upland areas already in good condition will maintain this condition over the life of the plan.

## Water Quality and Recreation Use

The operation of off-highway vehicles can adversely affect water quality by removing vegetation and compacting and rutting road surfaces. The more land that is open to off-highway vehicle use (Alternatives No Action, A, and B), the greater the ground disturbance and the greater the potential for soil displacement. Intensive recreation affects water quality primarily through the destruction of vegetation and compaction of soil. Recreation use is generally concentrated around water bodies, resulting in these effects occurring near water resources. Recreation can contribute to water quality problems through improper disposal of domestic and human wastes near recreation sites, soil disturbance in campgrounds, and activities such as swimming, wading, and boating. Recreation developments require access and effects associated with roads and trails can occur. The effects of dispersed recreation will be less than those resulting from intensive recreation. However, because dispersed recreation is widely spread, effects can be more difficult to locate and mitigate. Effects from off-highway vehicle and recreation use are expected to be low in the Proposed Resource Management Plan and in all alternatives.

## Water Quality and Mineral Activity

Mineral exploration and development can have potential effects related to vegetation removal, road construction, and possible disruption of aquifers or mixing of groundwater. Surface disturbance from mineral exploration and/or extraction, and from construction of facilities can result in accelerated soil erosion, with subsequent sedimentation to water bodies near the activity. Mining activities can also affect water quality by exposing spoils piles and tailings to erosion. Compaction will result from construction of facilities, which can decrease infiltration and possibly result in an increase of surface runoff and/or a decrease in groundwater aquifer recharge. If groundwater is intercepted during road or drill pad construction, its quality can be lowered by the introduction of sediment. Suction dredging could disturb stream substrate, increase sediment levels,



disturb in-stream vegetative and biotic communities, and cause areas of unstable banks. Mining activity in the planning area is expected to be primarily rock and cinder quarries and geothermal exploration and development (see Appendix N for Mineral and Non-Mineral Development Scenarios). The scope of these effects is related to the amount of acreage involved and the amount and magnitude of surface and subsurface disturbance resulting from mining activities (see Soils section in this Chapter for a summary of surface disturbance effects). Effects are expected to be low in the Proposed Resource Management Plan and all alternatives due to the limited amount and type of activity anticipated and due to design and placement of the activities. Guidance contained in Chapter 2 for mineral activity in Riparian Reserves, best management practices, and lease stipulations and operating standard guidelines contained in the Proposed Resource Management Plan will mitigate most effects resulting in little or no degradation of water quality.

Appendix N, Mineral and Non-Mineral Development Scenarios, contains a summary of the anticipated effects of the proposed Salt Caves Hydroelectric Project. The Oregon Department of Environmental Quality denied issuance of a 401 Certification for the project based in part on findings that the proposed project would cause increased temperatures in the Klamath River, resulting in violations of state water quality standards. After appeals of the decision to deny certification were upheld, the City of Klamath Falls submitted a new application for a 401 Certification from the Department of Environmental Quality. Because no information on any modifications on project design are currently available, it is assumed that the project has been modified (probably by altering water use and flows in the Klamath River) to meet state water quality standards. It is expected that the Federal Energy Regulatory Commission will update the required environmental documentation to reflect any changes in project design.

## Water Quality and Fire

Wildfire and prescribed fire can cause water quality degradation. Wildfire can have many serious effects, because it often occurs during very dry periods when high intensity fires burn. This can leave little ground cover for protection from direct rainfall. Severe burns can also change the character of some soils, causing them to become water repellent which decreases their infiltration capacity. These changes will lead to increased sedimentation and increased potential for mass soil movement in areas with steep slopes following the destruction of vegetation and exposure of the soil. The flushing of ash deposits into streams

can alter the concentration of some chemical elements, while the loss of vegetation in riparian-wetland areas will expose the water surface to increased solar radiation. Fire suppression measures and salvage operations can also cause adverse effects, such as soil compaction and displacement, loss of soil cover, creation of hydrophobic soils and disturbance or burning of riparian-wetland area vegetation. In most instances, the effects of wildfire and the risk of wildfire in much of the planning area outweighs the potential adverse effects of prescribed burning (which can be of much less magnitude).

Prescribed burning has the potential to affect water resources in a manner similar to that described above, but to a much lesser magnitude. Those alternatives that identify the most acreage to be treated with prescribed fire (the Proposed Resource Management Plan and Alternatives C, D, and E) will have a higher risk of adverse effects; however, prescribed fire will reduce the risk of wildfire and severe burns occurring. The application of Riparian Reserve guidelines in Chapter 2 and implementation of best management practices (Appendix F) will help prevent and/or will reduce adverse effects.

## Watershed Condition

Effects of management actions on water resources are analyzed using information (such as harvest acres, miles of road construction, areas of burning, and yarding systems) from the Ten-year Representative Timber Management Scenarios and mineral development scenarios.

A relative watershed condition index was used in the Draft to evaluate the alternatives by comparing the potential of cumulative changes in the condition of selected watersheds (called analytical watersheds) throughout the planning area. The watershed condition index is not used in the Final Proposed Resource Management Plan/Environmental Impact Statement as an analytical tool. The reasons for dropping the watershed condition index include: the information upon which the watershed condition index was calculated in the draft Resource Management Plan is out of date due to significant logging activities on private and industrial lands; the difficulty in updating and predicting forest management activities because of inexact probable sale quantity projections for any particular watershed; and it was felt that requirements for Watershed Analysis in the Supplemental Environmental Impact Statement Record of Decision and Proposed Resource Management Plan will provide a more revealing and complete assessment of current watershed condition and will provide a more appropriate foundation for resource management decisions.

## Chapter 4 - Environmental Consequences

Livestock grazing and forest management activities have the greatest potential effect on water resources and watershed condition in the planning area. Table 4-2 provides a comparison of the number of acres in each analytical watershed that, through the Ten-year Timber Representative Timber Management Scenarios and TRIM-PLUS calculations, may be affected by timber harvest. This table is provided as a means to numerically assess relative effects between the alternatives and the Proposed Resource Management Plan based on land use allocations and resource management guidelines. It is assumed that the greater the number of acres treated within an analytical watershed, the greater the risk of adverse effects on watershed condition. Due to the inaccuracies of these models and pending the results of Watershed Analysis, large differences in the actual number of acres harvested in a particular Analytical Watershed during implementation of the Proposed Resource Management Plan or any of the alternatives can occur.

Table 4-3 lists the percent of BLM-managed land in each Analytical Watershed, the percent of BLM managed land in each Analytical Watershed that is expected to be entered in the next ten years under the Proposed Resource Management Plan, and the percent of the total Analytical Watershed that will be entered, based on modeling.

For each of the analytical watersheds, estimation of activity on private lands is difficult. During the life of the plan half of the available merchantable timber on private lands may be harvested. The intensity of harvest on private lands can be attributed to high lumber prices and the need to salvage dying white fir and ponderosa pine. Extended drought, overstocked stands, exclusion of fire, insects and disease are causing major forest health problems within the planning area on both BLM and non-BLM lands. Watershed Analysis will assess the effects of private land management activities along with effects from BLM and U.S. Forest Service management. A variety of resource issues will be examined, including forest health, landscape and habitat patterns, fire history, human settlement and management, erosion, roads, and several aspects of water quality and quantity. The results of Watershed Analysis will provide the basis on which future ecosystem-based land management programs and projects will be implemented. In addition, most of the planning area north of Highway 66 is contained within three Key Watersheds (Spencer Creek, Clover Creek and Jenny Creek). Because Key Watersheds are to serve as a system of large refugia and will receive high priority for Watershed Restoration, impacts to this portion of the planning area from BLM management activities will

be minimized. Furthermore, the broad scale application of the Aquatic Conservation Strategy in the Proposed Resource Management Plan will significantly reduce the potential of adverse cumulative effects.

Based on implementation of the Aquatic Conservation Strategy (Riparian Reserves, Watershed Analysis, Key Watersheds and Watershed Restoration), management guidance contained in Chapter 2, and implementation of best management practices in Appendix F, it is expected that watershed condition in the planning area will improve over the life of the plan. Because BLM-administered land is intermingled with other ownership in a checkerboard pattern or one even more fragmented in much of the planning area, any improvements in watershed condition or water quality and quantity on BLM-managed land can be masked or nullified.

## Other Effects

Implementation of harvest levels associated with all the alternatives (except Alternative No Action) will result in a trend towards improved watershed conditions on BLM-administered lands because of a decrease from Alternative No Action in acres affected by timber harvest activities. The Proposed Resource Management Plan and Alternatives C, D, and E will benefit upland watershed and riparian-wetland area conditions, due to changes in livestock management and the emphasis on achieving regrowth of vegetation and obtaining properly functioning condition. Implementation of Proposed Resource Management Plan management direction in Chapter 2 and the best management practices in Appendix F will provide levels of water resource and watershed protection substantially above current (Alternative No Action) levels. Riparian Reserves in the Proposed Resource Management Plan will provide the greatest protection of riparian-wetland areas and, therefore, of water quality.

## Summary

Under the Proposed Resource Management Plan, local effects of timber harvest on water resources will generally be short-term and will tend to diminish as areas revegetate and soil conditions improve. On a watershed scale, however, continual disturbance and long-term hydrologic changes will result from harvesting in one area while an adjacent area is still recovering from previous harvests (regardless of ownership). Direct increases in turbidity and sediment due to surface disturbing activities, such as road construction, will usually be short term and will tend to diminish to

**Table 4-2. Timber Harvest Acreage Comparison Among Alternatives by Analytical Watershed (Total acres entered over a ten year period).**

Alternative	Analytical Watersheds			
	Barnes Valley Creek	Lower Buck Lake	Middle Spencer Creek	South Hayden Creek
A	624	830	1097	997
B	582	993	1686	876
C	527	319	1741	288
D	580	240	56	929
E	9	66	37	0
PRMP	302	641	946	492

**Table 4-3. BLM-Administered Land by Analytical Watershed (by percentages).**

Analytical Watershed	Percent BLM	Percent BLM Land Entered <sup>1</sup>	Percent of Analytical Watershed Entered
Barnes Valley Creek	43	3	1
Lower Buck Lake	37	18	7
Middle Spencer Creek	42	23	10
South Hayden Creek	46	15	7

<sup>1</sup> Total acres entered over a ten year period (expected life of the plan) under the Proposed Resource Management Plan.

levels that are greater than pre-disturbance levels as the areas re-stabilize. The effects of compaction and displacement on water quantity, and the subsequent indirect effects on turbidity and sediment, will be long term and will last as long as the surface remains detrimentally compacted.

Throughout the planning area, there is concern about cumulative effects and their associated potential for degradation for water quality. Determination of whether thresholds for cumulative effects are being approached or even surpassed in a watershed has been made especially difficult by the extended drought. Watersheds exhibit stress during periods of high peak flow; however, below-normal precipitation

in the planning area in recent years has not produced such peak flows to make possible stream damage obvious. Runoff from the winter of 1993 was not as severe as it could have been, although it was significantly higher than other years. Little obvious damage occurred on BLM-administered lands from this high runoff event, which is a positive sign regarding the health of the planning area's watersheds. The generally stable soils and gentle slopes that characterize the planning area help moderate adverse cumulative effects, although the west side of the planning area can be considered sensitive to cumulative effects. A checkerboard land ownership pattern exists on much of the west side, with BLM-administered lands comprising 50 percent or less of any total

watershed area. Due to the fragmented land ownership in much of the planning area, water quality and quantity is heavily influenced by management practices on non-BLM-administered lands.

The effects of timber harvesting, road building, and livestock grazing on sediment production will create the greatest risk of adverse cumulative effects in these and other watersheds in Alternatives No Action, A, B, and D because of the combination of higher number of acres and roads needed to harvest the scheduled timber volume and the assigned animal unit months and seasons of use. Effects from sediment in these alternatives can affect 1st and 2nd order streams directly (due to the lack or type of buffer assigned to these drainages), and 3rd order and larger streams indirectly. Those alternatives that have the potential to produce greater amounts of sediment will also have the greatest risk of producing cumulative effects to channel conditions. Increases in sediment at some point exceed a stream channel's ability to effectively adjust and stream erosion can occur. Conversely, Alternatives C and E are expected to have a lower risk of adverse cumulative effects. Implementation of the Proposed Resource Management Plan, with its associated Aquatic Conservation Strategy, is expected to have the least adverse cumulative effect.

Cumulative effects from water temperature increases, water yield increases, changes in timing of peak flows, and other effects to water quality will be of lower risk than effects from sedimentation in the Proposed Resource Management Plan. Selective harvest methods will minimize increases in peak flows, and Riparian Reserves on streams will protect stream temperatures. The emphasis on managing livestock grazing in riparian-wetland areas to obtain or maintain proper functioning condition under the Proposed Resource Management Plan will reduce cumulative sediment and stream temperature effects. The risk of adverse cumulative effects will be reduced in all alternatives through successful implementation of management direction in Chapter 2 and best management practices in Appendix F.

# Effects on Biological Diversity

## Introduction

The alternatives have the potential to affect biological diversity in terms of species diversity, genetic diversity, ecosystem diversity, and landscape diversity.

Analysis of effects on these elements is filled with uncertainty, because biological diversity has not been intensively researched. Thus, a number of indicators of diversity have been selected for analysis. Although the baseline for assessment of effects is the existing situation, biological diversity can only be defined in the context of the model provided by nature. Human activities have been affecting the ecosystems of Oregon for thousands of years, but those effects have escalated substantially in the last 140 years, as described in Chapter 3.

Effects on biological diversity on BLM-administered lands would be the result of management activities for timber, livestock grazing, wildlife habitat, and fire. Significant indicators of the effects of plan alternatives on biological diversity are their effects on individual species or categories of species, particularly on threatened, endangered, and other special status species (discussed in the Effects on Wildlife and Effects on Special Status Species sections of this chapter). Effects on special status species are summarized in Tables 4-4 and 4-5.

## Species Diversity

**Timber Harvest.** Under Alternatives No Action, A, B, and D, forested communities would be subject to intensive timber harvesting. Although multiple canopy stands would be maintained through a portion of each rotation because of the need for frost protection, the landscape would continue to be modified toward a patchwork of mostly even-age stands of various sizes and ages, separated by riparian management areas and unsuitable woodlands. In even-age stands the younger and older forest age classes provide the greatest species diversity. The mid and late seral stages which typically have closed canopies are far less diverse (Long 1977, Shoomaker and McKee 1988, and Bruce et al. 1985). Wildlife species diversity is least where the mid and late seral stages of regulated forests dominate the landscape (Long 1977), and canopy closure is greatest.

Under Alternatives C and the Proposed Resource Management Plan less intensive timber harvesting would occur in BLM-administered forests, including the mature and old growth forests, that would be more structurally and serally diverse. Wildlife species diversity is greatest when the forest is dominated by a mix of old growth/mature and early successional stages. A patchwork of this mix, if it includes some large, older forest patches, favors species adapted to young and old seral stage extremes, as well as those adapted to the ecotones (edges) that occur between the extremes (Logan et al. 1985).



**Table 4-4. Comparison of Alternatives, Changes in Components of Biological Diversity, Short Term (10 years).**

Aspects of Biological Diversity	Alternatives						
	NA	A	B	C	D	E	PRMP
Special Status Animals (except spotted owls)	-	-	0	+	0	+	+
Special Status Plants	0	-	-	-	0	+	+
Older Forest (Open Canopy)	-	-	-	+	-	+	0
Early Seral Stage	+	+	+	0	+	-	0
Genetic Diversity <sup>1</sup>	x	x	x	x	x	x	x
Unique Ecosystems (talus, meadows)	-	-	-	+	0	+	+
Riparian-Wetland Areas	0	-	-	0	0	+	0
Snags/Wildlife Trees	-	-	-	+	0	+	+
Dead and Down Material	-	-	-	+	0	+	+
Fragmentation of Older Forest	-	-	-	+	-	+	0

+ = improving/increasing    0 = maintaining    - = declining

<sup>1</sup> Although genetic diversity would change under every alternative, the current state of knowledge does not warrant value judgements about that change, and therefore is not analyzed.

**Table 4-5. Comparison of Alternatives, Changes in Components of Biological Diversity, Long Term (100 years).**

Aspects of Biological Diversity	Alternatives						
	NA	A	B	C	D	E	PRMP
Special Status Animals	-	-	0	+	0	+	+
Special Status Plants	0	-	-	-	0	+	+
Older Forest (Open Canopy)	-	-	-	+	-	+	0
Early Seral Stage	+	+	+	0	+	-	0
Unique Ecosystems (talus, meadows)	-	-	-	+	0	+	+
Riparian-Wetland Areas	0	-	-	0	0	+	0
Snags/Wildlife Trees	-	-	-	+	0	+	+
Dead and Down Material	-	-	-	+	0	+	+
Fragmentation of Older Forest	-	-	-	+	-	+	0

+ = improving/increasing    0 = maintaining    - = declining



## Chapter 4 - Environmental Consequences

Under Alternative E, a large amount of forest land would be managed for the maintenance or restoration of old growth characteristics. In the long term this would reduce the structural and seral diversity within BLM-administered forests, but would provide the structural components and diversity of species typical of mature and old growth seral stages in a landscape where those elements would not be provided on land administered by other parties. Alternatives that maintain or increase older forest habitats would, however, benefit species diversity more than those that maintain or increase the early seral stages. Those species that can survive in a variety of habitats, including the early seral stage, would be expected to survive at viable levels despite habitat losses.

Computer models of vertebrate species' response to habitat fragmentation show that species diversity would begin to decline when 50 to 75 percent of the landscape is intensely harvested within a period that did not provide for the return of late-successional forest (Lehmkuhl et al. 1991). Lehmkuhl and Ruggiero (1991) developed a vulnerability analysis of 93 species associated with late-successional coniferous forests of the region. Eighty percent of the species fell into the moderately high and high risk categories.

**Livestock Grazing.** Under the Alternative No Action, livestock grazing carrying capacities and seasons of use in some areas would continue at a level that would provide for a diversity of seral stages of range land plant communities, while other areas would support only the earlier seral stages of range land vegetation types resulting from localized problems in range management. Under Alternatives A and B, relatively high carrying capacities and long seasons of use for livestock would result in a landscape dominated by the low structural and species diversity characteristic of the earlier seral stages of range land vegetation. Those seral stages are dominated by annual grasses, forbs, and/or an expansion of undesirable shrubs on range lands, and by a simplified species composition in the understory vegetation of forest communities. This would result in diminished wildlife habitat diversity on both upland and riparian sites (BLM 1990, Schulz and Leininger 1990). Under Alternatives C, D, and the Proposed Resource Management Plan, carrying capacities and seasons of use for livestock would provide for a diversity of seral stages of range land vegetation, and the structural and species diversity that are characteristic of those seral stages. These communities would include examples of the potential natural communities dominated by native perennial grasses, native shrubs, and the diversity of native wildlife species that are dependent on those habitats. Forest understory communities would maintain or develop the

structural and species diversity that are more reflective of the site conditions.

Under Alternative E, carrying capacities and seasons of use for livestock would promote the development of the potential natural community that is characteristic of a particular range land site, given the frequencies and intensities of natural disturbance events. Similarly, the reduced level of livestock grazing would allow forest understory communities to develop the structural and species diversity that are typical of old growth forests. In the long term, this would reduce the structural and seral diversity within BLM-administered lands, but would provide the structural and species diversity that are typical of mature, old growth, late, and potential natural community seral stages in a landscape where those elements would not be provided by land administered by other parties.

**Vegetation Management Practices.** The use of vegetation management practices, including mechanical and chemical (herbicide application) methods, would affect the relative abundance of the species being treated, but would not substantially diminish the high level of diversity in the managed forest. However, these practices would accelerate succession, shortening the length of time in the early seral stage when a high level of species diversity prevails. As the conifer stands reach closed canopy condition, the relative abundance of tree species would differ from natural conditions, but the diversity would usually be the same. Diversity of shrubs, forbs, and grasses in the forest understory would decline as stands reached closed canopy condition. The scale of these effects would vary across the alternatives relative to the area that would be subject to those practices. Additionally under Alternative C, forest management would encourage species diversity and retain open canopy conditions in some young stands.

Thinning of timber stands would affect the relative abundance of tree species in a stand, but would not affect the overall diversity of species across the landscape. Under Alternatives No Action, A, B, and D, thinning would result in an increase in composition by the principal commercial species. Under Alternatives C, E, and the Proposed Resource Management Plan, these practices would attempt to maintain the species composition characteristic of an area before those areas were managed for timber production.

**Fire Management.** Fire management would affect community structure, species diversity, and the relative abundance of species in those communities (Halpern 1987). These effects would vary relative to fire behavior parameters such as intensity, rate of spread, and fuels consumption, which in turn are related to fire

management prescriptions for fuel moisture, relative humidity, wind speed, and prescribed fire season. Past fire and timber management practices have resulted in hazardous fuel loads in many areas and the expansion of fire-intolerant species, such as white fir in the mixed conifer zone and western juniper in the ponderosa pine zone and range lands. Projection of the recent wildfire record noted in Chapter 3 indicates that 25 percent of BLM-administered forest lands could burn in stand-replacing fires in the next 100 years. Management under all alternatives in Chapter 2 includes an under-burning program to reduce hazard fuels in forested communities in the planning area. This program would reduce the probability of catastrophic, stand replacing fires, which were not typical of these forests before management. Therefore, in the long term less forest area would be subjected to those types of fires than recent data would indicate. Consequently, less forest area would support the vegetation typical of the early seral stages of secondary succession than would be predicted from recent fire records.

Under Alternatives No Action, A, and B, prescribed fire would be applied mainly to commercial forest lands during the spring when fuel moistures are high and fire behavior could be more easily predicted. Burning at this time of year would affect structure, species diversity, and relative abundance of species in communities by favoring species that have phenological cycles (see Glossary) that enable them to persist or reproduce successfully after a spring fire. Under Alternatives C, D, E, and the Proposed Resource Management Plan, prescribed fire would also be applied on some lands that would not be managed for timber production, including range lands. Objectives of the fire management prescriptions would also include wildlife habitat enhancement, livestock forage enhancement, removal and control of western juniper, hazard fuel reduction, and the reintroduction of fire as an ecosystem process, which would promote the development of the diversity of native communities characteristic of the variety of environments in the planning area. Generally, prescribed fire prescriptions would allow for burning during the fall, after hazard fuel loads have been reduced. Burning at this time of year would more closely imitate the natural fire cycle to which native species are adapted. This would affect structure, composition, and relative abundance of species in communities by favoring species that have phenological cycles that enable them to persist and/or reproduce successfully after a late summer or fall fire.

**Seeding/Planting.** Seeding or planting of native or exotic plant species to either provide additional forage for wildlife or domestic livestock or to stabilize disturbed areas would affect the local diversity of plant species immediately after the plantings. Long-term changes in

species diversity and relative abundance in the various seral stages of vegetation succession may result from changes in nutrient cycling regimes from extensive use of nitrogen fixing species (such as legumes) in the plantings. Under Alternatives No Action, A, and B, where the most cost effective or easily available seed sources are used, long-term changes in species diversity and relative abundance could result from use of exotic species, if those species have the capacity to persist through successional stages or to invade other ecosystems. Under Alternatives C, D, E, and the Proposed Resource Management Plan, seed of native species would be used if available, and the probability of effects from the introduction of persistent and invasive exotic species would be reduced.

**Nutrient Cycles.** Fertilization of timber stands would affect the relative abundance of understory plant species through alteration of the nutrient cycling regime, but would not affect the overall diversity of species across the landscape. The scale of these effects would vary across the alternatives relative to the number of acres treated. However, fertilization could affect the relative abundance of species in communities across the forested landscape in the long term as the cumulative number of acres fertilized increases. The level of fertilization of tree plantings under the Alternative No Action, and nutrient inputs (especially near riparian zones and wetland areas) resulting from the higher carrying capacities and longer seasons of use for livestock under Alternatives A and B, would affect the diversity and relative abundance of species in aquatic ecosystems. Runoff from these management activities could elevate nutrient levels in aquatic ecosystems, which would favor expansion by native species adapted to those conditions, such as cattails, and/or the invasion of similarly adapted exotic pest species, such as purple loosestrife. Under Alternatives A, B, C, D, E, and the Proposed Resource Management Plan, the small area relative to No Action proposed for fertilization of tree plantings would result in less nutrient inputs from fertilization and therefore less potential for runoff to affect nutrient levels in aquatic habitats and thereby the aquatic vegetation. Also, the lower levels of carrying capacities and seasons of use for livestock under Alternatives C, D, E, and the Proposed Resource Management Plan would reduce the nutrient inputs to aquatic habitats from this source and, therefore, aquatic vegetation would be less affected.

## Genetic Diversity

All silvicultural systems and practices have the potential to affect the genetic diversity of stands through selection for desired traits in thinnings, decisions on which

trees would be harvested in partial cut units, selection of the genotype and species to be used in reforestation, and tree breeding activities (Millar et al. 1990). Silvicultural systems that retain larger numbers of green trees in harvest units, such as those proposed under Alternatives C and the Proposed Resource Management Plan, would probably most resemble natural units in genetic diversity.

Genetic diversity of the commercial conifer species planted in artificially reforested areas would be similar to that of natural stands but could be affected due to introduction of selected stock from a diversity of similar locations outside each immediate harvest area. A decrease in natural genetic diversity could occur if natural seedlings have a competitive disadvantage relative to selected stock and are consequently suppressed. Planning-area-wide, the range of genetic traits of commercial conifer species would be similar to today's range, but the frequency of genes and genotypes could be altered.

Range, wildlife habitat, and forest management activities, including silvicultural practices, could also lead to genetic change, most obviously by exclusion of some species (Franklin et al. 1981). Less obvious changes could entail loss of specific genes or alleles due, for example, to substantial reduction in the populations of some species. Changes in genetic diversity that are independent of species diversity are not expected to affect the survivability of any species. Intensive forest management practices in Alternatives No Action, A, and B, and high levels of forage utilization by livestock in Alternatives A and B, however, could lead to isolation of some populations of a number of species as a result of habitat loss, thereby reducing their genetic diversity in the long term.

## Community Diversity

An important aspect of community diversity is the variety of special habitats (bogs, meadows, rock cliffs, and talus slopes) that exist on BLM-administered lands in the planning area. The effects on these communities would vary across the alternatives relative to the width of buffers around those features or the silvicultural systems applied in a particular alternative. These communities generally would not be directly affected by management actions with the buffers around them under Alternatives C, D, E, and the Proposed Resource Management Plan. Indirect effects, such as changes in microclimate and alteration of energy flow between these communities and adjacent areas, would decrease across the alternatives relative to the increasing width of the buffers,

with the widest buffers (up to 300 feet) maintained in Alternative E. In Alternatives No Action, A, and B the buffers might not be wide enough to always protect these communities from direct effects, and indirect effects could also be more severe. Also in Alternatives No Action, A, and B, such buffers would not normally be maintained around small (less than 0.5 acre) pockets of these special habitats, which would make them particularly vulnerable to incidental disturbance from activities on adjacent lands.

Riparian-wetland area condition, also discussed in the Effects on Riparian-Wetland Areas section, serves as an early indicator of effects on ecosystem health. The effects of the alternatives on special habitats, riparian-wetland areas, and research natural areas are summarized in Tables 4-4 and 4-5.

The hardwood component of timber stands and brushfields on BLM-administered lands provide another important component of biological diversity. This component would remain relatively intact under Alternatives No Action and E, but would be reduced by conversion of some lands (those considered to be conifer sites) to conifer production under the other alternatives. Such conversion would return conifers to lands previously converted to hardwoods and brush as a result of wildfires followed by limited reforestation. This would change habitat, reducing and changing species diversity and ultimately biological diversity in those areas. The reductions in brushfield acres by alternative are as follows: Alternative A, 80 acres; Alternative B, 55 acres; Alternative C, 40 acres; and Alternative D, 65 acres. Under Alternatives No Action, E, and the Proposed Resource Management Plan there would be no brushfield reductions. The reduction of shrub and juniper dominated communities on range lands in the Proposed Resource Management Plan would be an unavoidable effect, changing the relative abundances of plant and animal species in those areas.

Although older forest stands have much greater structural diversity than the younger stands that are the result of recent timber management, young stands resulting from the timber harvest practices proposed in all alternatives would have more structural diversity than stands resulting from timber harvest in the 1960s and 1970s. This is due to retention of down logs and large trees. However, this diversity would still be less than that provided by the older natural stands. In all the alternatives, retention prescriptions would maintain overstory trees after logging, for frost protection of understorey trees and maintenance of other resource values, which would provide some structural diversity. Effects on one



specific component of structural diversity, snags and wildlife trees, are discussed in the Effects on Wildlife section and are summarized in Tables 4-4 and 4-5.

Functional relationships would obviously be affected by the loss of structures in which the function operates. For instance reduction in coarse woody debris in forest ecosystems could result in a loss of habitat for organisms that fix nitrogen and transfer that nitrogen to trees (Amaranthus et al. 1989).

Dead and down woody material would decrease under all alternatives due to the underburning program, which is designed to reduce the level of hazard fuels in the planning area. However, target levels of dead and down material that would be set under all alternatives would result in a maximum amount of this structural habitat component in the long term while achieving objectives for hazard fuel reductions. These objectives would approximate the maximum amount of this habitat component that would have been present in these forest types before timber management and the implementation of fire suppression policies. Dead and down woody material could be reduced below target levels in the long term under Alternatives No Action, A, B, and D due to commercial use of this material generated by relatively intensive timber harvest levels. The amount of dead and down woody material under Alternatives C and the Proposed Resource Management Plan would approach target levels in the long term and would most closely approximate the structural diversity that is natural to these forest types.

Since large dead and down woody material decays very slowly and all alternatives would leave some such material in harvested areas, only small differences in the amount of this material remaining would be expected among the alternatives in the short term. In the long term, however, those lands planned for intensive timber harvest at relatively short intervals would not regrow trees of large enough size to contribute large down woody material. Thus, within 100 years, such material would largely disappear from the lands managed in that way. This loss would be greatest under Alternative No Action and least under Alternative E. Under Alternative C no lands would be managed so as to reduce the amount of dead and down woody material below levels thought natural to these forest types.

Cumulative effects are expected to reduce the overall amount of dead and down woody material. Most private timber companies use intensive management practices and manage on short rotations, which would reduce the amount of such material.

## Landscape Diversity

A significant aspect of forest landscape diversity is fragmentation of mature and old growth forest stands. Of concern are both the size of remnant patches and spatial arrangement, or distance, between patches. In Alternatives No Action, A, and B, old growth blocks in the long term would be only those stands currently mature or older that are not allocated for a final timber harvest in an alternative. Under the forest management prescriptions in Alternatives C, D, E, and the Proposed Resource Management Plan, some managed stands would be mature and old growth stands in 100 years. For all alternatives, some old growth blocks would be lost in the long term due to major natural disturbance events, such as wildfires.

On the east side of the planning area, landscape diversity would be affected by the fragmentation of late seral and potential natural community blocks. Components of biological diversity could be affected by the size and spatial arrangement, or distance, between these blocks. In all alternatives except C, the blocks managed for late seral and potential natural communities on the east side coincide with designated areas of critical environmental concern. For all the alternatives, the loss of late seral and potential natural communities blocks in the long term would occur due to natural disturbances, but these fire-adapted ecosystems would recover relatively quickly.

In all the alternatives many of the old growth and potential natural community blocks would be dissected by roads that are not planned for closure because of the need for their continued use for access to other lands, including private lands. Under the terms of existing reciprocal right-of-way agreements, additional roads could be constructed, even though blocks are excluded from consumptive management under an alternative.

If alternative access routes are considered more ecologically damaging, the BLM could construct roads through blocks that are excluded from consumptive management to provide access to other BLM-administered lands. The effect of existing and possible future roads has not been considered in the identification of interior old growth forest habitat, but they would clearly diminish the quality of the habitat in these blocks.

Blocks of old growth, retained or restored, would provide some useful connectivity between the major reserves (wilderness areas) in the Winema, Klamath, Fremont, Rogue River, and Modoc National Forests, except in Alternatives No Action and A. The stron-

gest connectivity would be provided by the extensive pattern of lands managed for retention and maintenance of old growth forest and potential natural community in Alternative E. This strong connectivity would also be provided by the larger blocks in Alternative C, which are buffered on forest lands by a connectivity corridor of BLM-administered lands that would be managed to retain substantial old growth characteristics throughout time. Similarly, range management under Alternatives C and the Proposed Resource Management Plan would support a mosaic of native/species/dominated plant communities that would provide connectivity between the restoration and retention blocks. The old growth forest blocks in Alternatives B and C would be well stratified by elevation (tree breeding) zone.

The distance between old growth stands and potential natural community blocks, if large, could lead to isolation of some species of animals and plants that rely on these habitats. The resulting inbreeding could reduce the ability of these species to survive. An indicator of spatial fragmentation on forest lands is the distance between blocks of old growth (age 200+). The Old Growth Definition Task Group (1986) indicated that stands smaller than about 80 acres are so influenced by edge conditions that they lack interior forest conditions. Interim old growth definitions (U.S. Forest Service 1993) indicate that old growth ponderosa pine stands, 40 to 100 acres in size, can provide habitat that supports viable populations of old growth related species. Patch size that will provide effective old growth habitat will vary depending on the management and characteristics of the surrounding landscape.

**Mature and Old Growth Seral Stages.** Old growth is defined as being at least 10 percent stocked with trees 200 years or older. For analytical purposes, it is assumed that 40 percent of the high retention areas under Alternative C would support stands that possess old growth characteristics (as defined by the Old Growth Definition Task Group), and another 40 percent would support mature forest 100 years from now. It is also assumed that 33 percent of stands managed under prescriptions providing for low basal area retention would be mature forest in 100 years.

Most forest lands intermingled with BLM-administered lands in the checkerboard ownership pattern on the west side of the planning area are privately owned, with a substantial portion owned by wood products companies. Most of these lands would continue to be managed for intensive timber production. Little mature and old growth forest would remain on these lands, so such forests on BLM-administered and national forest lands would provide essentially all the

mature and old growth that remains in the planning area. Recent estimates of old growth forest remaining on national forest lands in western Oregon, by the U.S. Forest Service and the Wilderness Society, are approximately 1.9 million acres. Added to the approximately 400,000 acres of old growth stands on BLM-administered lands in the region, this represents 15 percent of all western Oregon forest lands. In contrast, it has been estimated that prior to Euro-American settlement, 60 to 70 percent (the amount was not static but fluctuated) of western Oregon and Washington forests were old growth (Franklin and Spies 1984). One subregional study shows that only 40 percent of the Oregon Coast Range was old growth in 1850 (Teensma et al. 1991).

Although the Forest Service has not yet calculated the acreage of old growth stands on National Forests in western Oregon that would be retained under the Supplemental Environmental Impact Statement Record of Decision comparison of analyses in the Supplemental Environmental Impact Statement and in the Forest Service's 1992 spotted owl Environmental Impact Statement suggests that it would be approximately 1.5 million acres. The BLM's six proposed Resource Management Plans for western Oregon would provide for the retention of approximately 288,000 acres of old growth, which would result in a cumulative total approaching 1.8 million acres. As existing younger stands age and develop old growth characteristics, BLM-administered lands in western Oregon are expected to support 336,000 acres of old growth stands after 10 years and 718,000 acres after 100 years. These figures make allowance for anticipated losses due to catastrophic events. Recently completed plans for the Winema National Forest, as it would be modified by the decision on the U.S. Forest Service's 1992 Final Environmental Impact Statement, *Management Direction on Northern Spotted Owls*, provides management of 274,000 acres for old growth, including 110,200 acres of current old growth stands.

**Early and Mid Seral Stages.** The relatively short harvest rotation on many private forest lands means that a substantial portion of them, at any given time, would be in the early seral stage, with most of the remainder in the mid seral stage. In a cumulative sense, these two seral stages would dominate throughout the future on the sum of all ownerships in the planning area.

Most lands intermingled with BLM-administered lands on the east side of the planning area are privately owned. Most of these lands would continue to be managed for activities that provide a reasonable level of economic return for the land owners. The primary



economic activities on these lands are livestock production, timber production, and irrigation farming. The high forage utilization resulting from large carrying capacities for livestock and cultivation methods used in farming would result in a substantial portion of lands, at any given time, supporting early seral stage or cultivated vegetation. In a cumulative sense, these vegetation-types would dominate the landscape throughout the future on the balance of all ownerships in the planning area.

## Summary

**Alternative No Action.** Under Alternative No Action, timber management would result in forest lands dominated by even-age stands predominantly in the early to late seral stages. While species diversity is high in the early seral stages of forest communities, the species diversity added by the mature and old growth seral stages would be missing. Some risk of productivity decline would exist over time due to the reduction of structural and functional diversity components (Franklin et al. 1989). These even-age stands, the relatively frequent harvest rotations, and the relatively low level of protection for special habitats would also result in a low level of ecosystem diversity. Landscape diversity would be low because BLM-administered forest lands would be managed similar to the surrounding private lands. Range management would continue to offer a diversity of seral stages on range lands in some areas, although some areas would have low species and seral diversity resulting from problems in range management in those areas.

**Alternative A.** Under Alternative A, effects on forest lands would be similar to those under Alternative No Action. Species diversity would be lower than if mature and old growth seral stages were better represented. Ecosystem and landscape diversity would also be low. Some risk of productivity decline would exist over time due to the reduction of structural and functional diversity components (Franklin et al. 1989). Range management under this alternative would result in range lands dominated by the low structural and species diversity characteristic of the earlier seral stages of range land vegetation. Landscape diversity would be low because BLM-administered range lands would be managed similar to surrounding private range lands.

**Alternative B.** Under Alternative B, species, ecosystem, and landscape diversity on forest lands would be higher than in A due to the establishment of old growth blocks distributed by seed zone across the planning area. However, effects on forest lands

outside the old growth blocks would be similar to those under Alternative A. Some risk of productivity decline would exist over time due to the reduction of structural and functional diversity components (Franklin et al. 1989). Range management under this alternative would be similar to Alternative A, but would have slightly more species and ecosystem diversity due to lower carrying capacities and shorter seasons of use for livestock, and wider buffer zones for special habitats.

**Alternative C.** Under Alternative C, the establishment of old growth restoration and retention blocks and less intensive timber harvest practices in biological corridor areas would result in forests that would be both structurally and serally diverse, including the mature and old growth forests. Lower levels of stand density and the use of prescribed fire could result in higher vigor of individual plants and an increase in community and ecosystem stability (see the Forest/Ecosystem Health section). Range management would have livestock carrying capacities and seasons of use that would provide for a diversity of seral stages of range land vegetation, and the structural and species diversity characteristic of those seral stages. Since diversity benefits ecosystem stability, ecosystems under this alternative would be more stable than those resulting from Alternatives A, B, and D (Franklin et al. 1989).

**Alternative D.** Under Alternative D, effects on forest lands would be similar to those under Alternatives A and B, since no large reserves for the northern spotted owl would be established in the planning area. Some risk of productivity decline on forest lands would exist over time due to the reduction of structural and functional diversity components (Perry 1989). Range management would have livestock carrying capacities and seasons of use that would provide for a diversity of seral stages of range land vegetation, and the structural and species diversity characteristic of those seral stages. Since diversity benefits ecosystem stability, range land ecosystems under this alternative would be more stable than those resulting from Alternatives A and B (Franklin et al. 1989).

**Alternative E.** Under Alternative E a large amount of forest land would be managed for the maintenance or restoration of old growth characteristics and would provide the structural components and diversity of species typical of those seral stages. While this would result in lower species and seral diversity within BLM-administered lands, landscape diversity would increase since forest lands managed by other parties would not offer the species, seral, and structural diversity of mature and old growth seral stages.

## Chapter 4 - Environmental Consequences

Range management under this alternative would have livestock carrying capacities and seasons of use that would promote the development of the potential natural community characteristic of a particular range land site, given the frequency and intensity of natural disturbance events. While this would result in lower species and seral diversity within BLM-administered lands, landscape diversity would increase since range lands managed by other parties would not offer the species, seral, and structural diversity of the late and potential natural community seral stages.

**Proposed Resource Management Plan.** Under Proposed Resource Management Plan, the establishment of Late-Successional/District Designated Reserves and less intensive timber harvesting practices in Late-Successional/District Designated Reserve buffers would result in forests that would be both structurally and serally diverse, including mature and old growth forests. Lower levels of stand density and the use of prescribed fire could result in higher vigor of individual plants and an increase in community and ecosystem stability (see the Forest/Ecosystem Health section). Range management would have livestock carrying capacities and seasons of use that would provide for a diversity of seral stages of range land vegetation, and the structural and species diversity characteristic of those seral stages. Since diversity benefits ecosystem stability, ecosystems under this alternative would be more stable than those resulting from Alternatives A, B, and D (Franklin et al. 1989).

## Effects on Ecosystem Health

### Forest Health

The alternatives have the potential to affect ecosystem health to the extent that management actions address the causes of the observed accelerated, widespread mortality of conifers. The goal of any forest/ecosystem health restoration treatment is to restore the vigor, resiliency and stability of the respective ecosystem, whether it is aquatic habitat or an old growth forest. The different alternatives vary in the extent that vegetation treatments mimic moderate intensity natural disturbances that would result in lower, more natural levels of tree densities, and species compositions reflective of site conditions. The resulting ecosystems would be more resilient and sustainable. Under the Proposed Resource Management Plan,

additional specific forest/ecosystem health treatments would be prescribed that would result in higher vigor of individual plants, more natural levels of mortality, and lower fuel loads.

Two proposed treatments described in the Proposed Resource Management Plan that would affect forest/ecosystem health in the Klamath Falls Resource Area are prescribed fire and thinning (See Figure 2-2). In some instances, both treatments will be applied to a site because of excessive fuel loads.

### Prescribed Fire

Management under all alternatives in Chapter 2 includes an underburning program to reduce hazard fuels in forested communities in the planning area. Under Alternatives No Action, A, and B, prescribed fire would be applied mainly to commercial forest lands during the spring when fuel moistures are high and fire behavior could be more easily predicted. Objectives would be limited to the reduction of hazard fuels. Forest/ecosystem health could be improved through a reduction in stand density, but this effect would be limited by limitations on the intensity of the disturbance, and the limited area to which prescribed fire is applied.

Under Alternatives C, D, and E, some of the area on which prescribed fire would be applied would be lands that would not be managed for timber production, including reserves and range lands. Objectives of the fire management prescriptions would include wildlife habitat enhancement, livestock forage enhancement, removal and control of western juniper, and the reintroduction of fire as an ecosystem process that would promote the development of the diversity of native communities characteristic of a variety of environments in the resource area. Generally, prescribed fire prescriptions would allow for burning during the fall season after hazard fuel loads have been reduced. Relative to Alternatives No Action, A, and B, Alternatives C, D, and E would improve forest/ecosystem health through a reduction in stand densities that would reduce the relative abundance of fire intolerant, shade tolerant species. After reduction of hazardous levels of fuels, fall burning would introduce the timing and intensity of disturbance that would allow the development of plant communities within the range of natural variation in seral development across the landscape.

Under the Proposed Resource Management Plan, prescribed fire would be used specifically as a tool to

improve forest/ecosystem health. Prescriptions would be designed to reduce stand densities and fuel loadings to levels within the range of natural variation, and to favor species genetically adapted to the site and habitat type. These prescriptions would contribute to the improvement of vigor of individual plants and more natural levels of mortality. The Klamath Falls Resource Area has a variety of vegetative communities that had presettlement fire return frequencies ranging from 3 to 40 years. Therefore, the effects of the Proposed Resource Management Plan in increasing the number of acres treated through the use of prescribed fire would benefit forest/ecosystem health by returning some of the natural disturbance patterns to the area.

In some instances, a prescribed fire may not remove enough of the trees to relieve the stress created by competition for scarce resources. Under these conditions, both prescribed fire and thinning would be used to treat a site. Table 2-1 shows the acreages proposed under the different alternatives for both thinning and prescribed fire.

## Thinning

Thinning of forest stands would affect the densities, species composition and fuel loadings of the treated stand and in turn affect forest/ecosystem health. Most thinning treatments described in the alternatives [pre-commercial thinning and commercial thinning (Table 2-1)] would be beneficial and improve overall forest/ecosystem health to some extent, particularly in forests where fires have been suppressed. Improvements in forest/ecosystem health would be obtained to the extent that the alternatives propose some form of tree density and/or fuels management.

Table 2-1 lists two types of proposed harvesting: regeneration harvesting and commercial thinning/density management/uneven-age harvesting. Commercial thinning/density management/uneven-age harvesting would improve forest ecosystem health by producing lower, more natural levels of tree densities, higher vigor of individual plants, and species compositions reflective of site conditions. Regeneration harvesting would produce a landscape composed of mostly even aged stands without the species and structural diversity necessary for ecosystem stability. Therefore, the more commercial thinning/density management/uneven-age harvesting that is proposed in an alternative, the greater the potential for improvement of forest/ecosystem health.

Alternatives No Action, A, B, and D propose 290, 163, 155, and 177 acres annually of commercial thinning respectively, and overall forest/ecosystem

health benefits from thinning treatments would be minimal. Most of the harvesting under Alternative No Action, A, B, and D would be done using regeneration harvest prescriptions. Tree densities required for forest/ecosystem health on many hot, xeric (dry) sites found in south central Oregon may be lower than those produced by commercial thinnings under these alternatives. Also, under these alternatives, salvage harvests that only capture mortality (currently dead trees) could result in less vigorous, less productive forests composed of more shade tolerant, fire intolerant species that will continue to show mortality.

Thinning treatments under Alternative C and the Proposed Resource Management Plan would improve forest health to some extent because a moderate amount of commercial thinning is proposed (424 acres and 723 acres respectively). In contrast, Alternative E proposes only 13 acres of commercial thinning. Most density control of forested lands under Alternative E would result from the application of prescribed fire.

The 828 acres per year of commercial thinning proposed under the Proposed Resource Management Plan will contribute significantly to the improvement forest/ecosystem health. These treatments include specific prescriptions to improve forest/ecosystem health designed to result in higher vigor of individual plants, more natural levels of mortality, and lower fuel loads.

The forest ecosystem health problem in the inland western forests has been described as the primary management concern. O'Laughlin et al. (1993) has concluded that in many Inland West forests, the costs and risks of inaction are greater than the costs and risks of remedial action. O'Laughlin et al. (1993) state that without the application of needed silvicultural treatments and other tools consistent with ecosystem management within a fairly short time frame (15 to 30 years), there is great danger that over the next century this region's forest legacy will be a series of large, uniform landscapes recovering from wildfires and other ecosystems setbacks on a scale unprecedented in recent evolutionary time. Figure 2-1 indicates the potential benefits that will be derived from some of the restoration thinning and understory reduction treatments described in the Proposed Resource Management Plan.

## Range Health

All of the alternatives considered during the planning process have the potential to affect range land ecosystems depending on the levels, intensity, and/or

season-of-use, the suppression of fire, and other physically impacting land use activities. The goal of any land use activity would be that it takes place within parameters that allow for the restoration and/or perpetuation of proper functioning conditions. In general the Proposed Resource Management Plan and alternatives C, D, and E move the most towards proper functioning conditions, where they do not exist now, and perpetuates proper functioning conditions where they do exist. Alternatives No Action, A and B tend to move towards proper functioning conditions at the slowest rate.

Under the Alternative No Action and B, livestock grazing carrying capacities, seasons-of-use, and intensity of management activities would continue, in some areas, at levels that would provide for a diversity of healthy seral stages of range land vegetative communities, while in other limited areas the grazing pressures would result in less healthy seral stages. Under Alternative A, relatively high carrying capacities and lengthy seasons-of-use for livestock would result in less healthy vegetative communities dominated by low structural and species diversity characteristic of the earlier seral stages of range land vegetation. These seral stages are dominated by annual grasses, forbs, and/or an expansion of undesirable shrubs, and by a simplified species composition.

Under Alternatives C, D, and the Proposed Resource Management Plan, carrying capacities, seasons-of-use, and an increased intensity of management practices would provide for a diversity of healthy seral stages of range land vegetation, and the structural and species diversity that are characteristic of those seral stages. These proper functioning communities would include examples of the potential natural communities dominated by native perennial grasses, forbs, and shrubs.

Under Alternative E, dramatically reduced carrying capacities, limited seasons-of-use, and the tightly regulated management of livestock would promote the development of potential natural communities that is characteristic of a particular range land ecological site, given the frequencies and intensities of natural disturbance events. In the long term, this would reduce the structural and seral diversity within BLM administered lands, but would provide potential natural community seral stages to a landscape where those elements may not be provided by land administered by other controlling entities.

Although western juniper is a natural component in many range land ecosystems within the planning

area, it has invaded many otherwise non-juniper dominated natural vegetative communities. This is believed to be primarily due to livestock grazing suppressing other competing vegetation and allowing juniper a competitive advantage; and to the suppression of natural fire allowing juniper to achieve a density outside its normal range of variability. The relatively higher levels of grazing under Alternative No Action, A, and B would continue the grazing influenced advantage to juniper expansion; the Proposed Resource Management Plan and Alternatives C, D, and E would favor more vegetative competition with juniper. In addition, under all of the alternatives the number of acres of vegetative control, which includes reductions in juniper, is relatively high and would help replace natural fire as a competitive element to juniper expansion. Prescribed burning under Alternatives C, D, E, and the Proposed Resource Management Plan have relatively high levels that would help emulate natural conditions and repress invasive juniper. Alternative No Action, A, and B have relatively low levels of prescribed burning that would favor continued invasive juniper.

## Summary

**Alternative No Action.** Under Alternative No Action, no specific prescriptions would be designed to improve forest/ecosystem health. Limited improvements could result from reductions in stand densities from traditional commercial thinning and underburning to reduce hazard fuels. However, these improvements would be confined to commercial forest lands.

**Alternative A.** Under Alternative A, effects on forest/ecosystem health would be similar to those under No Action.

**Alternative B.** Under Alternative B, improvements to forest/ecosystem health could be higher than in Alternative A due to the establishment of old growth blocks where management actions to promote ecosystem processes and old growth conditions appropriate to the forest-type could result in lower levels of stand density. Prescribed fire and thinning treatments could result in higher vigor of individual plants and an increase in community and ecosystem stability. However, effects on forest/ecosystem health on lands outside the old growth blocks would be similar to those under Alternative A.

**Alternative C.** Under Alternative C, the establishment of old growth restoration and retention blocks and less intensive harvesting practices in biological



corridor areas would result in forests that would be both structurally and serally diverse, including mature and old growth forests. Lower levels of stand density and the use of thinning and prescribed fire could result in higher vigor of individual plants and an increase in community and ecosystem stability.

**Alternative D.** Under Alternative D, effects on forest/ ecosystem health would be similar to those under Alternatives A and B, since no large reserves for the northern spotted owl would be established in the planning area.

**Alternative E.** Under Alternative E, a large amount of forest land would be managed for the maintenance or restoration of old growth characteristics and would provide the structural components and diversity of species typical of those seral stages. Management actions to promote ecosystem processes and old growth conditions appropriate to the forest-type could result in lower levels of stand density and the use of prescribed fire could result in higher vigor of individual plants and an increase in community and ecosystem stability.

Under this alternative, using prescribed fire alone may not satisfactorily address the forest health issue in the short time frame that it needs to be addressed. Alternative E proposes only 13 acres of commercial thinning, therefore forest ecosystem health may not improve but in fact further degenerate.

**Proposed Resource Management Plan.** Under the Proposed Resource Management Plan, specific forest/ecosystem condition restoration treatments would be prescribed that would result in higher vigor of individual plants, more natural levels of mortality of conifers, and lower fuel loads. Additionally, the establishment of Late-Successional/District Designated Reserves and less intensive harvesting practices in Late-Successional/District Designated Reserve buffers would result in forests that would be both structurally and serally diverse, including mature and old-growth forests. Using a combination of prescribed fire and thinning treatments, stand densities and fuel loadings would be reduced, and species compositions would be favorably altered which would result in higher vigor of individual plants and an increase in community and ecosystem stability.

The Supplemental Environmental Impact Statement assessed the effects of alternatives on ecosystem quantity and quality (abundance and diversity, processes and functions, and connectivity); aquatic

ecosystems; risk of large-scale disturbances by fire, wind, insects, and disease; water quality; and long-term soil productivity. These analyses in part reflect ecological health considerations in the range of the northern spotted owl. The Supplemental Environmental Impact Statement conclusions relative to these analyses are briefly summarized as follows:

- ◆ during the next 100 years, Alternative 9 may not produce an outcome in which the quality and quantity of the overall late-successional ecosystem would be at least as high as the hypothesized long-term average condition. The Supplemental Environmental Impact Statement concluded that longer time frames may be necessary for this change to occur;
- ◆ Alternative 9 is expected to reverse the trend of degradation of aquatic ecosystems on federal lands. This includes recovery of riparian, aquatic, and watershed processes in all watersheds;
- ◆ Alternative 9 is expected to have the highest risk of large-scale wildfires within the dry and intermediate provinces and the least for the moist provinces. However, this risk will be reduced by vegetation modification such as proactive fire and fuels management including thinning and prescribed fire. Vegetation modification can also reduce the risk of large-scale disturbance caused by wind, insects and disease;
- ◆ Alternative 9 is expected to have low impacts on water quality; and
- ◆ Alternative 9 is expected to have moderate impacts on long-term soil productivity relative to the expected level of soil disturbance.

## Effects on Vegetation

### Introduction

For effects on special status/special attention plant species, see the Special Status/Special Attention plant discussion later in the chapter.

The alternatives have the potential to affect vegetation in terms of the relative abundance of species within communities, the relative distribution of plant communities, and the relative occurrence of seral stages of those communities. However, implementation of any alternative would not result in the complete elimination of a species (other than possibly a special status species), community, or seral stage.



## Chapter 4 - Environmental Consequences

The most significant effects on vegetation would be the result of management activities for timber harvest, livestock grazing, energy and mineral development, wildlife habitat (special habitat buffers), and fire. Other effects result from vegetation management practices (including silvicultural treatments), nutrient inputs, intensity of management practices, and the sale of special forest products. Effects on special status species are addressed in a subsequent section of this chapter. Also related to effects on vegetation, and discussed in other sections of this chapter, are effects on riparian zones and biological diversity. Effects on the structure, composition, and fragmentation of the forest and range lands in the planning area are discussed in the biological diversity section.

The relative abundance of plant species within communities is dependent upon both the structure of the vegetation, and the type, intensity, and frequency of disturbance events which influence that structure. In addition, the presence and relative abundance of plant species varies between seral stages and, at the landscape level, is affected by the percentage of land in the various seral stages. However, few species are associated with only a single seral stage, but can be found with varying frequency and abundance in at least two seral stages (Spies 1991).

### Timber Harvest

Under Alternatives No Action, A, B, and D, forested communities would be subject to the disturbance associated with intensive timber harvesting. Although multiple canopy stands would be maintained through a portion of each rotation because of the need for frost protection, the landscape would continue to be modified toward a patchwork of mostly even-age stands of various sizes and ages, separated by Riparian Reserves and unsuitable woodlands. Under Alternatives C and the Proposed Resource Management Plan disturbance from less intensive timber harvesting would result in BLM-administered forests that were more structurally and serally diverse. Alternative E would have a large amount of forest land managed for the maintenance or restoration of old growth characteristics. In the long term, this would reduce the structural and seral diversity within the forests managed by the BLM, but would provide the structural components and relative species composition typical of mature and old growth seral stages in a landscape where those elements would not be provided by land administered by other parties.

The establishment of a permanent network of skid trails on most timber units would cause a permanent

change in vegetation species composition and relative abundance due to the maintenance of compacted soil conditions in those areas. Plant species adapted to compacted soil conditions would be favored over other species in those areas, thus changing the characteristics of the understory vegetation. This network of skid trails would be designed to affect 12 percent or less of an activity area (harvest unit). However, the absolute number of acres affected would vary across the alternatives relative to the number of acres included in the commercial timber base in a particular alternative.

### Livestock Grazing

Under the Alternative No Action, carrying capacities and seasons of use in some areas would continue at a level that would provide for a diversity of seral stages of range land plant communities, while other areas would support the earlier seral stages of range land vegetation types resulting from localized problems in range management.

Under Alternatives A and B, disturbance associated with relatively high carrying capacities and long seasons of use for livestock would result in a landscape dominated by the low structural diversity characteristic of the earlier seral stages of range land vegetation. This vegetation would be dominated by annual grasses, forbs, and/or an expansion of undesirable shrubs on range lands, and by simplification of species composition in the understory vegetation of forest communities.

Under Alternatives C, D, and the Proposed Resource Management Plan, carrying capacities and seasons of use would be established to allow a level of disturbance that would provide for a diversity of seral stages of range land vegetation and the relative species abundances that are characteristic of those seral stages, including examples of the potential natural communities dominated by native perennial grasses and native shrubs. Understory vegetation in forested communities would also be less disturbed by livestock and would maintain or develop the structure and relative species composition that are more reflective of the site conditions.

Under Alternative E, carrying capacities and seasons of use would be adjusted to minimize disturbance and promote the development of the potential natural community that is characteristic of a particular range land site, given the frequency and intensity of natural disturbance events. Similarly, the reduced disturbance from livestock grazing would allow the understory vegetation on forest lands to maintain or develop the structure, species composition, and relative species

abundance that is typical of old growth community. In the long term, the dominance of late seral stages would reduce the structural and seral diversity within the lands managed by the BLM, but would provide the structural components and relative species composition that are typical of mature, old growth, and potential natural communities seral stages in a landscape where those elements would not be provided on land administered by other parties.

## Energy and Mineral Development

Surface disturbance due to development of energy (including hydroelectric) and mineral resources would affect the species composition and relative abundance of species in the vegetation on that site. Even after reclamation efforts, it would be unlikely that environmental conditions that would support the pre-disturbance plant community would be restored. The scale of these effects would vary across the alternatives as larger areas would have either surface restrictions on energy and mineral exploration and development, or no surface occupancy stipulations.

## Special Habitat Buffers

The effects on smaller vegetation communities that occur within special habitats (bogs, meadows, rock cliffs, and talus slopes) would vary across the alternatives relative to the width of the buffer around those features or the silvicultural systems applied in a particular alternative. These communities generally would not be directly affected by management actions because of the buffers around them in Alternatives C, D, E, and the Proposed Resource Management Plan. Indirect effects, such as changes in microclimate and alteration of the flow of nutrients between these communities and adjacent forest and range land communities, would decrease across the alternatives relative to the increasing width of the buffers, with the widest buffers (up to 300 feet) maintained in Alternative E. In Alternatives No Action, A, and B the buffers may not be wide enough to always protect these communities from direct effects, and indirect effects could also be more severe. Also in Alternatives No Action, A, and B, such buffers would not normally be maintained around small (less than 0.5 acre) pockets of special habitats and these would be particularly vulnerable to incidental disturbance from activities on adjacent lands.

## Fire Management

Fire management would affect both species composition and relative abundance in plant communities.

These effects would vary relative to fire behavior parameters, such as intensity, rate of spread, and fuels consumption, which in turn are related to fire management prescriptions for fuel moisture, temperature, relative humidity, and wind speed. Past fire and timber management practices have resulted in hazardous fuel loads in many areas and the expansion of fire intolerant species such as white fir in the mixed conifer zone and western juniper in the ponderosa pine zone and in range lands. Management under all alternatives includes an underburning program to reduce hazard fuels in forested communities in the planning area. This program would reduce the probability of catastrophic, stand replacing fires, which were not typical of these forests before management. Therefore, in the long term less forest area would be subjected to those types of fires than recent data would indicate. Consequently, less forest area would support the vegetation typical of the early seral stages of secondary succession than would be predicted from recent fire records.

Under Alternatives No Action, A, and B, prescribed fire would be applied mainly to commercial forest lands during the spring when fuel moistures are high and fire behavior could be predicted more easily. However, burning at this time of year would affect species composition and relative abundance in plant communities by favoring species that have phenological cycles enabling them to persist and/or reproduce successfully after a spring fire.

Under Alternatives C, D, E, and the Proposed Resource Management Plan, prescribed fire would also be applied to lands that would not be managed for timber production. Objectives of the fire management prescriptions would also include wildlife habitat enhancement, livestock forage enhancement, removal and control of western juniper, and the reintroduction of fire as an ecosystem process, which would promote the development of native plant communities to achieve biodiversity goals. Generally, prescribed fire prescriptions would allow for burning during the fall, after hazard fuel loads have been reduced. Burning at this time of year would more closely imitate the natural fire cycle to which native species are adapted, and would affect species composition and relative abundance in plant communities by favoring species that have phenological cycles that enable them to persist and/or reproduce successfully after a late summer or fall fire.

## Vegetation Management Practices

The use of vegetation management practices, including mechanical and chemical (herbicide appli-

cation) methods, would affect the relative abundance of target species, but would not eliminate those species. The scale of these effects would vary across the alternatives relative to the area that would be subject to those practices.

Silvicultural practices, such as thinning and planting, would affect relative species abundance depending on the selection of species to be planted or thinned. Under Alternatives No Action, A, B, and D, these practices would result in an increase in percent composition by the principal commercial species. Under Alternatives C, E, and the Proposed Resource Management Plan these practices would attempt to maintain or restore the species composition characteristic of an area before those areas were managed for timber production. Thinning would also affect the growth rates of the remaining trees.

Mechanical site preparation and ripping would affect the vegetation of the treated site. Although ripping is designed to mitigate the effects of soil compaction from timber harvest, it disturbs the existing vegetation on the site and creates an artificial habitat to which the pre-harvest understory plant communities would not be adapted. Mechanical disturbance also creates conditions in which many noxious weeds would have a competitive advantage over other species. Thus, plant species composition and relative abundance would be altered. The scale of these effects would vary across the alternatives relative to the number of acres in the commercial timber base that would be subjected to these treatments.

Seeding or planting of native or exotic plant species to provide additional forage for wildlife or domestic livestock, or to stabilize disturbed areas would affect the local composition of plant communities immediately after the plantings. Long-term changes in species composition and relative abundance of species in the various seral stages of vegetation succession could result from changes in nutrient cycling regimes from extensive use of nitrogen fixing species (such as legumes) in the plantings. Under Alternatives No Action, A, and B, the most cost effective or easily available seed sources would be used, long-term changes in species composition and relative abundance could result from use of exotic species, if those species have the capacity to persist through successional stages or to invade other plant communities. Under Alternatives C, D, E, and the Proposed Resource Management Plan, seed of native species would be used if available, and the probability of effects from the introduction of persistent and invasive exotic species would be reduced.

## Nutrient Inputs

Fertilization would not only affect growth rates of canopy trees, but would also affect relative abundance of understory species and successional processes through alteration of the nutrient cycling regime. The scale of these effects would vary across the alternatives relative to the area that would be subject to fertilization.

The level of fertilization of tree plantings under the Alternative No Action, and nutrient inputs (especially near riparian zones) resulting from the higher carrying capacities and longer seasons of use for livestock under Alternatives A and B would affect species composition and relative abundance in aquatic and terrestrial vegetation. Runoff from these management activities could elevate nutrient levels in aquatic habitats, which would favor expansion by native species adapted to those conditions, such as cattails, and/or the invasion of similarly adapted exotic pest species, such as purple loosestrife.

Under Alternatives A, B, C, D, E, and the Proposed Resource Management Plan, the small area of tree plantings proposed for fertilization would result in less nutrient inputs from fertilization and therefore less potential for changes in relative abundances of species and for runoff to affect nutrient levels in aquatic habitats and thereby the aquatic vegetation. Also, the lower levels of carrying capacities and shorter seasons of use for livestock under Alternatives C, D, E, and the Proposed Resource Management Plan would reduce the nutrient inputs to aquatic habitats from this source and, therefore, aquatic vegetation would be less affected.

Under the Proposed Resource Management Plan the total acres proposed for fertilization per year will not significantly affect relative abundances of species in the terrestrial or aquatic vegetation. Fertilization of timber stands would affect the relative abundance of understory plant species through alteration of the nutrient cycling regime, but would not affect the overall diversity of species across the landscape. The scale of these effects would vary across the alternatives relative to the number of acres treated. However, fertilization could affect the relative abundance of species in communities across the forested landscape in the long term as the cumulative number of acres fertilized increases.

## Intensity of Management Practices

The intensive level of management practices (timber harvest, silvicultural practices, road building, and

grazing) that would be implemented under Alternatives No Action, A, B, and (for timber) D would create the disturbed conditions under which many noxious weed species have a competitive advantage over other species native to a site. Further spread of these noxious weed species would be expected to occur under those alternatives. Under Alternatives C, E, and the Proposed Resource Management Plan, and (for grazing) D the reduced disturbance from management actions, such as silvicultural regimes that retain higher amounts of crown canopy and properly designed grazing management systems, would limit the further spread of noxious weed species. Under all alternatives, the implementation of the weed control measures described in the *Northwest Area Noxious Weed Control Program, Record of Decision* (1987) would tend to stabilize noxious weed populations on BLM-administered lands or result in their decline.

## Sale of Special Forest/Natural Products

The sale of special forest products, such as mushrooms and incense cedar boughs, could affect vegetation by altering the relative abundance of those species within the plant community.

Properly harvested, many special forest/natural products can sustain repeated harvest with little or no short term effects on resource availability. Special forest/natural products capable of repeated harvest are generally those with root systems that would not be disturbed during harvest operations. These special forest/natural products would include: perennials, species which grow from rhizomes such as Oregon grape and many hardwoods which sprout from stumps. Mushrooms are also capable of repeated harvest provided the below surface parent mycelium remains healthy. For some species light disturbance may stimulate growth of new vegetation and production of mushrooms.

## Summary

**Alternative No Action.** Under Alternative No Action, forest vegetation would be primarily composed of even-age stands of various sizes and ages, dominated by the early to late seral stages. Species mixes and relative species abundances typical of mature and old growth plant communities would be rare or absent. Range management would continue to support a diversity of seral stages on range lands in some areas, though some areas would support only early seral stages because of problems in range

management in those areas. The species mixes and relative species abundances typical of the potential natural communities would be rare or absent. The level and extent of disturbance associated with intensive management activities would be expected to create conditions where noxious weeds would have a competitive advantage. Therefore, noxious weed species would be expected to increase in extent and density despite control efforts.

**Alternative A.** Under Alternative A, effects on forest communities would be similar to those under Alternative No Action. The forested landscape would be dominated primarily by even-age stands in the early to late seral stages, and the species mixes and relative species abundances typical of mature and old growth forest communities would be rare or absent. Range management under this alternative would result in range lands dominated by the species mixes and relative species abundances of the earlier seral stages of range land vegetation. Plant communities typical of the late seral and potential natural communities would be rare or absent. The level and extent of disturbance associated with intensive management activities would be expected to create conditions where noxious weeds would have a competitive advantage. Therefore, noxious weed species would be expected to increase in extent and density despite control efforts.

**Alternative B.** Under Alternative B, forest vegetation would be primarily composed of even-age stands of various sizes and ages, dominated by the early to late seral stages. However, the species mixes and relative species abundances typical of mature and old growth forests would be added as a minor component in the landscape by the establishment of old growth blocks. Effects on range land communities under this alternative would be similar to those under Alternative A. The level and extent of disturbance associated with intensive management activities would be expected to create conditions where noxious weeds would have a competitive advantage. Therefore, noxious weed species would be expected to increase in extent and density despite control efforts.

**Alternative C.** Under Alternative C, the establishment of old growth restoration and retention blocks and less intensive timber harvesting practices in biological corridor areas would result in forest communities that would contain the species mixes and relative species abundances representative of all seral stages, including mature and old growth forests. Lower levels of stand density and the use of prescribed fire could result in communities similar to those that were typical of these forests before management. Range management would have livestock



carrying capacities and seasons of use that would provide for a diversity of seral stages of range land vegetation, and the species mixes and relative species abundances characteristic of those seral stages, including examples of the potential natural communities. The use of prescribed fire could result in communities similar to those that were typical of these lands before management. Less intensive management practices and project design features to minimize disturbance would reduce the potential for further spread of noxious weed species. Integrated weed management would, therefore, tend to stabilize or reduce noxious weed infestations on BLM-administered lands.

**Alternative D.** Under Alternative D, effects on forest vegetation would be similar to those under Alternatives A and B, since no large reserves for the northern spotted owl would be established in the planning area. Range management would have livestock carrying capacities and seasons of use that would provide for a diversity of seral stages of range land vegetation, and the species mixes and relative species abundances characteristic of those seral stages, including examples of the potential natural communities. The use of prescribed fire could result in communities similar to those that were typical of these lands before management. Less intensive management practices and project design features to minimize disturbance would reduce the potential for further spread of noxious weed species. Integrated weed management would, therefore, tend to stabilize or reduce noxious weed infestations on BLM-administered lands.

**Alternative E.** Under Alternative E a large amount of forest land would be managed for the maintenance or restoration of old growth characteristics and would provide the species composition and relative species abundances typical of those seral stages. Range management under this alternative would have livestock carrying capacities and seasons of use that would promote the development of the potential natural communities characteristic of a particular range land site, given the frequency and intensity of natural disturbance events. While this alternative would somewhat limit the plant communities occurring on BLM-administered lands, it would provide plant communities with the species composition and relative species abundances characteristic of mature and old growth forests, and the potential natural communities on range lands, that would not be provided by land administered by other parties. Less intensive management practices and project design features to minimize disturbance would reduce the potential for further spread of noxious weed species.

Integrated weed management would, therefore, tend to stabilize or reduce noxious weed infestations on BLM-administered lands.

**Proposed Resource Management Plan.** Under the Proposed Resource Management Plan, the establishment of Late-Successional/District Designated Reserves and less intensive timber harvesting practices in the Late-Successional/District Designated Reserve buffers would result in forest communities that would contain the species composition and relative species abundances representative of all seral stages, including mature and old growth forests. Lower levels of stand density and the use of prescribed fire could result in communities similar to those that were typical of these forests before management. Range management would have livestock carrying capacities and seasons of use that would provide for a diversity of seral stages of range land vegetation, and the species mixes and relative species abundances characteristic of those seral stages, including examples of the potential natural communities. The use of prescribed fire could result in communities similar to those that were typical of these lands before management. Less intensive management practices and project design features to minimize disturbance would reduce the potential for further spread of noxious weed species. Integrated weed management would, therefore, tend to stabilize or reduce noxious weed infestations on BLM-administered lands.

## Effects on Riparian-Wetland Areas

Healthy riparian-wetland areas benefit water quality, dry season quantity, and habitats supporting fish, wildlife, and plants. The effects of the alternatives on existing riparian zone conditions would vary depending upon the width of riparian management areas and the amount and type of vegetative disturbance occurring in and adjacent to those areas.

The riparian zones considered in this discussion are those associated with rivers, streams, lakes, reservoirs, and seasonal wetlands. (Further discussion of seasonal wetlands is in the Effects on Wildlife section under Special Habitats.) Discussions of water quality, fish, wildlife, and plants are in the Effects on Water Resources, Fish, Wildlife, and Vegetation sections of Chapter 4.

Disturbance to riparian zones could result from timber harvest or silvicultural treatment, road construction,



grazing (including livestock, wildlife, and wild horses), mineral exploration and development, or recreational development or activities. Riparian management areas and best management practices are designed to protect, maintain, or improve proper functioning condition of riparian zones (as defined by BLM's *Riparian-Wetland Initiative for the 1990s*) (see Appendix F). The narrowest average riparian management area width of any alternative would be 75 feet, which is assumed to be adequate for meeting state water quality regulations for temperature and turbidity. Riparian Reserves would have a minimum of 100 feet. Even though all alternatives have established riparian management areas or Riparian Reserves and recommended best management practices (see Appendix F) certain activities under some of the alternatives could affect these areas and their effectiveness. Table 2-1 shows the proposed riparian management areas or Riparian Reserves for each alternative.

Topics covered in this section are: riparian vegetation; floodplains and hyporheic zones (a maze of underground channels that flow among the gravels, sands, and rock that underlie many streams and rivers); effects by alternatives and a summary.

## Riparian Vegetation

Riparian vegetation strengthens streambanks, contributes woody debris, and governs the influx of light and organic matter to the stream (Meehan 1991). Potential adverse effects of management actions on riparian vegetation include a total loss of riparian vegetation and a change in vegetative structure, species diversity, and composition. Effects on riparian wildlife habitat are discussed in the Effects on Wildlife section. See also the Water Resources section for a discussion of potential effects.

Timber harvest could affect the vegetation in a riparian zone from trees falling or rolling into a riparian zone, or from logs being yarded across or out of a buffer. Roads constructed adjacent to or across streams could also remove vegetation or affect growth of vegetation in the riparian zone.

Open roads allow continuing traffic to cause soil disturbance and rutting tends to channelize runoff and increase sedimentation to the streams.

Vegetation removal in areas adjacent to riparian zones would adversely affect riparian microclimate conditions. It is assumed that stable microclimates may require buffer widths of approximately 300 to 400 feet on each side of the riparian zone. Adverse

effects on riparian microclimate conditions include higher air temperature and lower humidity, which could cause a shift in plant species composition from shade tolerant to intolerant species. It is likely that vegetation removal in areas adjacent to riparian management areas would adversely affect riparian microclimate conditions under all alternatives, however, the severity of microclimate changes would vary by alternative and by extent and type of disturbance. See Appendices P and S for information regarding juniper removal in riparian-wetland areas.

Removal of timber stands adjacent to riparian zones also leaves riparian vegetation susceptible to wind damage and wildfire. Large amounts of down or burned trees in a riparian zone can decrease the sustained input of large woody debris to the forest floor and stream channels, and reduce canopy cover.

It is likely that some increase in wind damage would occur in riparian management areas under all alternatives. Windthrow in riparian management areas is primarily a function of topography, orientation of the riparian management area relative to wind direction, and riparian management area width (Steinblums et al. 1984). Riparian management areas less than 100 feet wide would have the greatest potential for blowdown.

Prescribed fire adjacent to riparian management areas would likely enter the riparian management areas. Fire in riparian management areas, especially on sites with large concentrations of down wood, could burn at a high intensity, resulting in localized loss of organic matter (including large woody debris) and reduced streambank stability. Generally, air temperature, humidity, and fuel moisture conditions within riparian management areas limit the occurrence of high intensity burns in these areas, however, there would be some loss of riparian vegetation. Implementation of best management practices to lower fire intensities would reduce adverse effects, but prescribed fire would still result in a reduction of riparian vegetation density. In most cases, the adverse effects of prescribed fire would be minimal and of short duration. Recovery from prescribed fire would occur within 1 to 2 years.

Suppression of high intensity wildfires from riparian zones would maintain riparian conditions as long as the suppression (firelines, etc.) would not cause more damage than a wildfire. In the long term, continued fire suppression could allow fuels to accumulate to the point where the potential for catastrophic fire could become very great.

Livestock, wildlife, or wild horses could affect riparian zones by eating or trampling the vegetation in these areas. Effects of grazing in riparian zones are discussed in Appendix L. Recreational activities, such as fishing, swimming, boating, and off-highway vehicle use, could damage the vegetation in riparian zones.

There are positive effects that could occur in all alternatives. The BLM's current Riparian/Wetland initiative along with the Oregon/Washington Riparian Enhancement Plan has increased awareness and management of wetlands and riparian zones. Fish and Wildlife 2000, Range of Our Vision, and other long-term plans address continued improvement in riparian zones. The Gerber Riparian Demonstration Area is a district planning emphasis area and a BLM state riparian showcase. Continued management of this demonstration area would continue to benefit riparian conditions in the Gerber area. The Proposed Resource Management Plan also adopts the Aquatic Conservation Strategy as defined in the Supplemental Environmental Impact Statement Record of Decision. Watershed analysis will be conducted on Key Watersheds. These analyses will help define management direction on important watersheds.

## Floodplains and Hyporheic Zones

Floodplains temporarily store floodwaters thereby reducing the risk of downstream flooding. Standing and down trees and other vegetation create roughness of the floodplain surface and contribute to reduce stream velocities during high flows. Floodplain functions could be adversely affected by management activities that result in vegetation removal or surface disturbance. Adverse effects include less water storage capacity and subsequent increases in flood heights downstream. These activities would also make streambanks more susceptible to erosion by high water velocities.

Subterranean invertebrates thrive in a maze of underground channels that flow among the gravels, sands, and rock that underlie many streams and rivers (hyporheic zone). These underground waterways can be as deep as 30 feet and can extend sideways for miles from the stream channel. For most of the lower order streams, the extent of hyporheic zones is fairly limited due to the narrow valley floors along these headwater channels. The extent of the hyporheic zone generally increases with increasing stream order, with the widest zones occurring along major rivers. Management activities that disturb the soil surface or lower the water table of the hyporheic

zone would adversely affect the abundance and composition of the subterranean invertebrate population and subsequently affect aquatic organisms that are higher in the food chain.

Protection of floodplains and hyporheic zones would depend on the extent of these areas and would vary by alternative. Alternatives with the greatest protection of riparian vegetation would have the highest probability of adequately protecting floodplains and hyporheic zones.

## Effects by Alternative

**Alternative No Action.** In this alternative, streams are buffered by stream class not order (see Appendix 2-B in the draft). Timber management would be most intensive under this alternative. Extensive heavy cutting would severely affect riparian zones due to the removal of upland vegetation, which would reduce the effectiveness of the buffers. Due to the intensity of cutting and the short duration of replacement stands, the buffer strips could be more susceptible to damage from windthrow, logging, or site preparation activities. Roads and yarding corridors through riparian zones would remove vegetation. These crossings also affect stream and buffer health by concentrating runoff and increasing sedimentation reaching the stream. Such stream crossings increase the possibility of accidental damage to riparian buffers through landslides or windthrow in the buffer. Grazing activity would continue at existing levels, which would heavily affect some problem areas.

**Alternative A.** Timber management would be emphasized. Removal of trees adjacent to the buffers could decrease the effectiveness of the buffer to reduce sedimentation and provide woody material for the stream. Due to the intensity of cutting and the short duration of replacement stands, the buffer strips could be more susceptible to damage from windthrow, logging, or site preparation activities. Roads and yarding corridors through riparian zones would remove vegetation. These crossings also affect stream and buffer health by concentrating runoff and increasing sedimentation reaching the stream. Such stream crossings increase the possibility of accidental damage to riparian buffers through landslides or windthrow in the buffer. This alternative also maximizes livestock grazing use. Use of riparian zones would need to be monitored closely with heavy grazing expected in some areas. Off-highway vehicle use would be maximized and restrictions on mineral exploration and development would be minimized in this alternative, which could result in additional unplanned disturbances to riparian buffers.

**Alternative B.** The riparian buffers would be slightly larger and most uses would be less intensive than in Alternatives No Action or A. However grazing activity and off-highway vehicle use could still create heavy use areas. Although timber management would be less intensive, road development would be similar to that under Alternatives No Action and A and eventually all timber lands would be harvested.

**Alternative C.** Timber harvest prescriptions would retain a portion of the standing timber throughout the rotation period. This would increase the effectiveness of the riparian buffers due to the added protection from wind, sunlight, and sedimentation reaching the stream. Grazing management would also be more closely controlled due to allocation of fewer animal unit months and development of grazing systems, which would give more protection to riparian areas. Off-highway vehicle use would be controlled and the number of open roads or development of roads crossing streams would be reduced, decreasing the effects from those under Alternatives No Action, A, and B. Other types of recreational use, such as fishing and hiking, would be encouraged thereby increasing incidental damage to riparian zones.

**Alternative D.** Riparian buffers would increase under this alternative, however, timber management would be intensive in all areas except those withdrawn for recreation or northern spotted owls (13,500 acres). Accidental or incidental effects on riparian buffers would again become probable, although the effects would be less severe than under Alternatives No Action, A, or B because of the wider buffers. Riparian buffers would also be applied to 1st and 2nd order streams. Grazing effects would be greatly reduced due to construction of exclosures or eliminating cattle use in certain pastures for better protection of the riparian zone, as well as reduced animal unit months and shortened seasons of use compared to Alternatives No Action, A, B, and C. Increased recreational use could cause incidental damage to some riparian zones, however increased protection of special areas would also give added protection to riparian zones in the special areas.

**Alternative E.** The largest amount of timber stands would be reserved from timber harvest under Alternative E, which would result in the largest acreage of riparian zones protected. Livestock grazing would be tightly controlled decreasing the potential for riparian zones to be affected. Incidental damage from non-motorized recreational use could be the largest effect. Off-highway vehicle restrictions, wide riparian buffers, special area protection, and wild and scenic river designations would offer more protection to riparian zones than under any of the other alternatives.

The Proposed Resource Management Plan. Under the Proposed Resource Management Plan the riparian zones would be managed as Riparian Reserves. These reserves would be wider than the buffers proposed under the other alternatives. The width of these reserves would change depending on the importance or use of a stream (for example, fish spawning would increase the size of the reserve).

These reserves would be managed to comply with the Aquatic Conservation Strategy of the Supplemental Environmental Impact Statement Record of Decision. Management activities would be designed to keep reserves healthy and effective. Silvicultural prescriptions outside Riparian Reserves would help create and maintain effective reserves.

The number of roads open to traffic would be reduced. The goal of reducing open road densities to 1.5 miles per section is less than what would be open in Alternatives No Action, A, and B. This density of open roads could be further reduced in Key Watersheds if analysis identifies a need for it.

The proper functioning condition of a stream would be maintained or sought during all management activities.

## Summary

Alternatives No Action and A would have the most potential and severe effects on riparian zones and stream health, because of the intensive timber management and grazing activity.

Alternatives B and D would have moderate effects. Timber management levels would be similar in these alternatives, however protection from grazing effects would be higher in Alternative D due to reduced animal unit months and construction of more exclosures to protect streams.

Timber prescriptions outside riparian zones in Alternatives C, E, and the Proposed Resource Management Plan would allow maximum effectiveness of buffers. Grazing management would also be effectively controlled. Although recreational use would increase, the effects should be minimal because of the emphasis on non-motorized recreation opportunities, off-highway vehicle restrictions, and special area protection.

Under most alternatives riparian conditions would improve in the short term because of increasing maturity and diversity of riparian vegetation. Indirect use, such as recreation, could offset the positive effects of increasing maturity of vegetation in some of

the riparian zones. Riparian vegetation could experience some growth setbacks under Alternatives No Action, A, and B due to grazing and off-highway vehicle use. Continued drought conditions could cause additional setbacks in all alternatives.

Conditions under Alternatives No Action, A, and B are expected to be fair due to narrow riparian management area widths, intensive grazing, and intensive timber management. At the end of the long term, expected riparian conditions under Alternatives C, D, E, and the Proposed Resource Management Plan would be good/optimal.

Riparian buffers were designated according to stream class in the Alternative No Action, which could provide better protection with wider buffers on certain low order streams. However intensive timber harvest and current grazing practices in some areas would keep riparian conditions from improving.

Under the Proposed Resource Management Plan reserves are widened on intermittent streams if important resources occur.

The Aquatic Conservation Strategy and the streams proper functioning condition will be the objectives of the Proposed Resource Management Plan.

Overall, cumulative effects on riparian zones would be affected by management of adjacent and upland private lands and other public lands, such as U.S. Forest Service lands. This is especially pertinent where BLM-administered lands are checkerboarded, such as Oregon and California lands on the west side, or where the BLM only administers a small portion of riparian zones, such as in the Bryant Mountain or the Pokegama areas (west of Highway 97). Cumulative effects on BLM-administered lands would be highest in Alternatives No Action and A due to the intensive harvest levels and the total number of riparian zones that would be affected. Livestock grazing would also contribute to the cumulative effects due to the direct removal of vegetation from many riparian zones. Cumulative effects would be reduced in Alternatives B, C, D, and the Proposed Resource Management Plan (respectively) due to larger buffers/reserves, reduced timber harvest, and proper livestock grazing management practices. Alternative E would have the least cumulative effects.

## Effects on Wildlife

### Introduction

Habitat indices were calculated for some priority habitats and species for the existing condition and alternatives by use of habitat models (BLM 1991c). Several of these models have received wide professional acceptance; for example, elk (Wisdom et al. 1986) and cavity dwellers (Marcot 1991; Neitro et al. 1985). Others were derived by BLM biologists and planners specifically for this and other western Oregon BLM Environmental Impact Statements. The analysis of wildlife effects is based in part on the analysis in the Supplemental Environmental Impact Statement where applicable. Indices derived under the various models predict such factors as the amount, quality, and distribution of habitat. In cases where habitat models were unavailable or were not derived, analysis of impacts was based on literature references or personal communications with experts and/or professional judgement of BLM specialists.

In this section, general effects of major land use activities are described, followed by detailed analysis of effects of the alternatives on selected priority habitats and species. Thomas (1979) and Brown (1985) indicated that certain wildlife species are associated with forests of a particular age class and structure. A discussion of the importance of seral stages and special habitats and animals associated with those vegetation communities can be found in the Wildlife section of Chapter 3. The Vegetation section of Chapter 3 describes the vegetation communities. The close affinity of wildlife for specific habitat conditions underscores the importance of analyzing impacts of forest management activities on habitat composition. Effects of the alternatives on some seral stages (such as mid and late) and species (such as upland gamebirds) are not analyzed in detail because the effects were considered minor or similar across the alternatives. Discussions of other species, such as waterfowl and sandhill cranes, are combined to avoid redundancy.

Under all alternatives, the range of the probable sale quantity and proposed buffers would allow protection of various priority wildlife species without affecting the management of other resources.

### Effects on Habitat

The following discussion describes allocations that affect habitats. Timber management affects wildlife primarily by modifying their habitat. Timber manage-



ment practices would greatly reduce the amount of available thermal cover, which is important during hot summers or periods of inclement weather. Timber harvests would have a short-term benefit for the forbs and grasses that respond to disturbed soils and reduced canopy cover.

Some silvicultural activities, such as vegetation control, would reduce available forage. Pre-commercial thinning and timber harvest would create slash and debris that could inhibit movement of wildlife. Increased uses of this fiber or biomass could reduce these effects. The effects of these activities would vary according to the size and distribution of the timber harvest units, and the intensity of timber management in each alternative.

Roads have major effects on wildlife habitat by the short-term removal of vegetation (such as for skid roads), and long-term effects by the elimination of vegetation within the rights-of-way (BLM roads and roads constructed under reciprocal rights-of-way agreements). Other effects, such as disturbances on wildlife, would be caused by increased human access. Big game species are especially vulnerable to these road effects (Brown 1985). Road construction associated with intensive timber management under the Ten-year Representative Timber Management Scenarios are shown in Table 4-1. Additional roads would be built by private land owners for logging access and other purposes. Blocking roads with gates and barricades, and designating roads as closed to public motor vehicle traffic would benefit elk, deer, and other wildlife by reducing harassment, disturbance, and poaching.

Fire management affects wildlife habitat in two significant ways. Prescribed burning removes vegetation and logging slash and changes species structure and composition. When used in conjunction with timber harvest as a site-preparation technique, burning increases the available forage for big game and other herbivores, and it also helps speed the re-establishment of conifer stands. Burning can also be used in big game management areas, old growth reserves, and other habitats to maintain or create desired habitat conditions and reduce the risk of catastrophic wildfires. Fire suppression has resulted in seral changes in vegetative communities that create different habitat conditions and could eventually lead to increased risk of catastrophic fires.

Improved water quality and watershed management would benefit most wildlife by providing them with cleaner, reliable drinking water. Many species are also dependent on these systems for part of their life cycle (see the Wildlife section in Chapter 3).

Range management activities could have a mix of negative and positive effects. Negative effects would be direct competition for forage or wildlife avoiding areas used by cattle. Fences, cattle guards, and other management structures could create movement obstacles or barriers for animals, such as big game. Some positive effects of range land improvements include vegetation treatments and development of springs, reservoirs, and salting areas. Besides direct benefits to wildlife they would also provide an indirect benefit by helping distribute cattle to achieve more even utilization of the available forage.

Recreation developments could result in habitat loss or alteration, but the primary effects are associated with increased human disturbance to sensitive habitat areas, such as nest sites, winter ranges, hibernacula caves (habitat niches where certain animals overwinter). Open roads for recreational and off-highway vehicle use would have a negative effect on wildlife population due to disturbance of wildlife caused by increased access.

Mineral exploration and development, quarry sites, waste disposal sites, and rights-of-ways could all affect wildlife, but the degree of effect would depend on the type, intensity, and season of the activity.

Effects on wildlife habitat are based on the expected availability of certain seral stages and unique and other special habitats under each alternative in relation to the existing condition. Also related to effects on wildlife are effects on vegetation and biological diversity which are also discussed in this chapter. Individual effects on special status species, including northern spotted owls, are addressed in the Effects on Special Status Species section of this chapter, and effects on fish are discussed in a separate section also.

## Seral Stages

**Early Seral Stage Conifer Forest Habitat.** Effects on species associated with early seral stages would vary based on the amount of regeneration timber harvest that would occur under each alternative.

Under Alternatives No Action, A, B, and D, a relatively intensive timber harvest program would result in the largest acreage of early seral stage stands. Species associated with these habitats would benefit. However, the lack of snags and dead and down woody material in those alternatives would reduce the suitability of early seral stage stands for several species, such as salamanders, western bluebirds, and American kestrels. The resulting larger, more



#### **Chapter 4 - Environmental Consequences**

contiguous blocks of uniform age classes would create barriers to movement and dispersal for species with lower mobility, such as salamanders and small mammals.

Alternative D would also create large amounts of early seral stage habitats, but the higher level of retention of snags, green trees, and dead and down woody debris would mitigate some of the adverse conditions in Alternatives No Action, A, and B. The early seral stages would be interspersed with greater amounts of older stands contained in larger riparian management areas, northern spotted owl reserves, and lands not allocated to restricted timber management.

Alternatives C, E, and the Proposed Resource Management Plan would provide considerably less early seral stage habitat, especially in the long term. As in Alternative D, these alternatives would retain more structural components (old growth) within early seral stands following timber harvest. More lands would be allocated for old growth emphasis, northern spotted owl habitat, or protected habitat areas, and/or Late-Successional/District Designated Reserves. Large areas would be lightly cut and would retain greater canopy closure and more structure in Alternative C and the Proposed Resource Management Plan. These actions would still result in suitable early seral stage habitat for many species, but would reduce forage quality and quantity for big game and other herbivores, and could otherwise reduce the habitat quality for some species, such as western bluebirds, swifts, and nighthawks.

Early seral stage habitats would be very abundant on private lands within the planning area due to intensive timber management practices on those lands. Alternatives No Action, A, B, and D would have negative cumulative effects on seral stage diversity by creating a preponderance of the early seral stage types across the landscape. Alternative E would create a situation of old growth habitat on BLM-administered land and early seral stages on private land across the landscape. Alternative C and the Proposed Resource Management Plan would provide a mixture of seral stage habitats, which would be a benefit to seral stage diversity. Under Alternative C and the Proposed Resource Management Plan, early seral vegetation will be present in harvest areas, however openings (1 to 3 acres in size) will have to be planned.

In summary, Alternatives No Action, A, B, and D, would result in large areas of early seral habitat, and would lack much of the large wood structure found in other alternatives and in areas regenerated naturally by fire. The other alternatives (C and E) and the Proposed Resource Management Plan would create

much less early seral habitat, and would retain more snags, large green trees, and dead and down woody debris. Silvicultural prescriptions in Alternative C and the Proposed Resource Management Plan would also allow for a more diverse mix of seral stages.

#### **Mature and Old Growth Conifer Forest Habitat.**

Wildlife species associated with older forest habitats would be affected in relation to the amount and condition of the habitat available (see the Wildlife section in Chapter 3). In turn, the amount and condition of older forest habitat would depend on the rate and type of timber harvest and successional processes as the stands grow older.

Some old growth would be available in areas withdrawn for special status species (such as bald eagles), Riparian management areas, or recreation developments; however, these areas generally would be too small to be effective. It is likely that little or no older forest habitat would be available on non-federal lands in the short or long term.

Alternatives No Action, A, B, and D, would remove most of the remaining mature and old growth habitat on lands allocated to timber management within approximately 30 years. Rotation age would be shorter and stands might never regain old growth characteristics. Older forest blocks on lands not allocated to forest management would generally be small, fragmented patches with little habitat value for species associated with old growth forests. It is anticipated that the habitat conservation area 4 in Alternative D and the seed zone old growth blocks in Alternative B also would be too small to adequately function as ecological old growth habitat for most species.

The old growth retention and restoration blocks in Alternative C would provide 5,600 acres of old growth habitat in the short term and up to 11,600 acres of old growth habitat in the long term. The corridors in which these blocks are located would be managed to retain a relatively high canopy closure (high retention areas). For some species, such as canopy dwelling birds and small mammals and perhaps for some salamander species, this level of canopy retention would still provide suitable habitat. This high canopy retention would also buffer the old growth blocks to some degree and reduce the heating and drying effects associated with abrupt edges.

In the short term, however, this management regime would degrade habitat quality for other species so that they would no longer be able to find suitable conditions. Brown cowbirds, great horned owls, and other species adapted to a variety of habitats would

invade this habitat and could displace or prey upon species associated with interior old growth habitat. In the longer term, this management regime would regenerate habitat conditions comparable to old growth stands approximately 30 years after regeneration harvest. As a result, in 100 years approximately 40 percent of BLM-administered lands within these areas would provide old growth habitat conditions.

The corridors in Alternative C were designed to provide dispersal habitat and movement for species between significant reserves, such as wilderness areas. The corridors in the Klamath Falls Resource Area attempt to provide connectivity between large reserves along the crest of the Cascade Range with the California Cascades, the Klamath River, or the Klamath Mountains to the south and west.

For small species with limited dispersal capabilities, such as salamanders and small mammals, it is likely that these corridors would provide a higher level of connectivity compared with the relatively hostile conditions that would be found in the intensively managed (general forest management area) landscape under Alternatives No Action, A, B, and D. Outside of the corridors, the managed landscape under Alternative C would still pose substantial migration barriers to these species. For more mobile species these corridors could prove effective only for feeding or reproduction. It is just as likely that these animals would attempt to disperse through the unsuitable habitat outside the corridors as it is that they would successfully move through the corridors. Over time, these lands would attain old growth characteristics sooner than under even-age regeneration harvests. Specifically concerning northern spotted owl habitat, it is estimated that suitable habitat conditions would occur within 30 years of a regeneration harvest.

The effectiveness of a corridor system is debatable due to a lack of applicable research. However Alternative C is an attempt to use this system to improve dispersal and biodiversity.

Under Alternative D, some old growth would be available for timber harvest in the 80-acre category 4 habitat conservation areas, unsuitable woodlands, and special management areas. Dispersal for northern spotted owls between these habitat conservation areas would be provided by maintaining at least 50 percent of BLM-administered land in dispersal habitat conditions (trees with an 11 inch average diameter at breast height and 40 percent canopy closure). Dispersal between these areas for species with lower mobility such as salamanders and small mammals would be more questionable.

In Alternative E, 9,630 acres of existing older forest would be reserved from harvest and in the long term old growth could occur on approximately 19,160 acres, which is more old growth habitat than any other alternative. These stands would become somewhat less fragmented over time in some areas. The west side of the Klamath Falls Resource Area would be dominated by old growth with very little mix of seral stages. As these stands grew older, they would inevitably be subject to wildfire, bug kill, and other disturbances. There would be no provisions for replacing old growth habitat if these disturbances occurred. As a result, it is likely that older forest habitat would start to decline in the long term.

In the Proposed Resource Management Plan, 1,235 acres (west side) and 144 acres (east side) of old growth would be withdrawn from the timber base for various reasons (such as Riparian Reserves and areas of critical environmental concern). Late-Successional/District Designated Reserve buffers would provide an additional 3,800 acres to be maintained as old growth/mature spotted owl habitat. Timber within the Late-Successional/District Designated Reserve buffers would be selectively harvested each decade, but stand conditions would always remain as old growth and mature habitat, which would provide habitat for the northern spotted owl. On BLM-administered lands that were adjacent to the Late-Successional/District Designated Reserve buffers, forests would be managed with high retention levels and would always exhibit some old growth characteristics. However they would not continue to provide old growth habitat at all times. These lands would be managed on a 120-year rotation and would be expected to regain most old growth characteristics within 30 years of harvest. This prescription calls for partial cutting or small patch cutting. Uniform partial cutting over a stand would generally alter the stand structure to the extent that it would no longer function as old growth habitat. Entries with small patch cuts could retain old growth habitat characteristics for many species.

Alternatives No Action and A would result in the least amount of older forest habitat withdrawn from the timber base. The prospects of retaining old growth stands in these alternatives would be very small. In Alternative A approximately 4,000 acres of old growth or mature would be harvested per decade.

Alternatives B and D would provide an intermediate level of old growth reserves. Harvest prescriptions would harvest approximately 5,400 and 4,400 acres of old growth and mature forest in the first decade, respectively. In the long term, all old growth or mature forest not reserved from harvest would be cut.

Alternatives C and the Proposed Resource Management Plan would provide an intermediate level of old growth habitat in the long term. Alternative E would provide the largest amount of old growth habitat in the short and long term, with a moderate degree of fragmentation. This alternative would have the least significant adverse effect on species associated with older forest habitat, especially in the short term.

Cumulative effects resulting from activities on the total land base (BLM-administered land and other public and private lands) would be detrimental to older forest habitats under all alternatives. It is likely that little or no older forest habitat would be available on non-federal lands in the short or long term. Reductions in mature and old growth habitat would be an irreversible adverse effect on wildlife. Widespread clearcutting on private lands in conjunction with harvest rates on public lands has led to a skewed distribution of younger age classes predominating throughout western Oregon (Oregon Department of Forestry 1990b). This cumulative effect and the probability of continuation of such practices on most private lands magnify the importance of mature and old growth habitat on public land as a relatively scarce habitat on a regional basis.

### Special Habitats

The primary resource feature in special habitats (wooded swamps, meadows, rock cliffs, talus slopes, and brushfields) would be protected under most alternatives. Intact forest buffers do not currently exist around some of these habitats. Buffering of special habitats would help maintain the desired habitat components (such as ecologically diverse habitat, including favorable microclimates) important to a diverse array of wildlife species that inhabit these areas. Timber management activities would affect special habitats by removing the edges of these areas. Once the edge has been removed it often changes the character and usefulness of the habitat.

If timber harvest removes the trees from the edge of a meadow, it could affect climate and possibly change the waterflow in the meadow. Many wildlife species would no longer have nesting or hiding cover near the meadow. Studies in the Salem BLM District determined that removal of tree cover along edges of small meadows reduced bird density and resulted in changes to bird species composition (Monthey 1983).

Removal of tree cover near talus slopes and rock cliffs or outcrops could change the microclimate and cover important in denning areas of bear, cougar, and bobcat.

Site preparation or vegetation control techniques could increase effects to brushfields, meadows, and wooded swamps. Fire could also affect these special habitats. Some of the effects of fire could be beneficial in hardwoods and brushfields by stimulating new growth.

Road construction would affect wildlife species by removal of cover and associated increases in disturbance and harassment that occur with the development of more roads. Rock quarry development would directly remove talus slopes and rock outcrops. Quarry site plans could mitigate some effects with the development of piles of large boulders and nest dugouts on quarry faces.

Heavy utilization by livestock could affect special habitats by changing the structure of brushfields and wet meadows. Mineral exploration and development could also remove or destroy special habitats; however, the development would be treated on a site-specific basis and the possibility of significant mineral activity is not anticipated during the life of the plan. Additional effects, and a more thorough discussion of impacts to special habitats are discussed in the Final Supplemental Environmental Impact Statement Record of Decision. There is often a close relationship between the Final Supplemental Environmental Impact Statement special attention species and the special habitats.

Alternatives No Action and A would have the highest effects on special habitats due to the intensive forest management and road building planned. If all roads were open harassment would occur. Smaller buffers (as compared to other alternatives) would also increase the effect. Increased livestock grazing intensity could also affect special habitats, such as wet meadows, dry meadows, and riparian zones, by removing vegetation.

Alternative B would also affect the special habitats by removing cover and edge through timber operations. Road building would still occur and could remove some special habitats and allow increased access to these areas, increasing harassment.

Under Alternative C the prescriptions for timber management, proposed livestock grazing systems, and increased buffer sizes would help reduce the effects on special habitats. Conversion of brushfields to timber would be reduced, however the rejuvenation of brushfields through prescribed fire would increase forage areas for big game.

Alternative D would have more special habitat reserve areas, however management of timber resources would increase in intensity from Alternative C. Indirect

effects of timber management would affect special habitats through changes in microclimate at the edges of those habitats.

Little acreage would be available for timber management under Alternative E. Reduced timber harvests, controlled livestock grazing, and restricted mineral activity would result in few impacts on special habitats.

The Proposed Resource Management Plan buffers special habitats. The protection levels would consider the potential impacts to these special habitats, accounting for the extent of habitat, amount of habitat in the vicinity, and intensity of impacts. Prescriptions for timber management would lessen the impacts to the edges of these buffers thereby improving the effectiveness of the buffers. Special habitats would also be protected under proposed grazing management and minerals development. The Proposed Resource Management Plan also provides protection for special habitats as identified by the Supplemental Environmental Impact Statement Record of Decision (see the Chapter 2 Special Status and Supplemental Environmental Impact Statement Special Attention Species section).

## **Other Special Habitats**

**Coarse Woody Debris.** Several wildlife species depend on down logs as a key habitat component (see the Wildlife section in Chapter 3 and Brown 1988). Salamanders and other amphibians live in rotten logs, while small mammals use logs for runways, feeding sites, and den sites.

The major effects of management activities on coarse woody debris is the removal of logs during timber harvest or during salvage operations, and the removal of standing trees and snags that would have provided down logs in the future. Fire management activities also affect coarse woody debris; prescribed burning removes much of the material and changes the character of the remaining down logs if they are partially consumed.

The characteristics of coarse woody debris that are important for wildlife habitat include the diameter and length of the logs, the level of decay, and the total amount available. Larger logs remain intact longer and provide more stable moisture conditions than smaller logs. Partially decayed logs allow salamanders, small mammals, insects, and other species to burrow through the logs and find adequate living conditions. Logs in advanced stages of decay also provide important reservoirs of moisture and nutrients. The amounts needed to support certain wildlife species are unknown.

All alternatives would result in a long-term decline in the amount of coarse woody debris currently available in the landscape. Alternatives No Action, A, B, and D would remove coarse woody debris over much of the planning area. Presumably, wildlife species that require this habitat characteristic would decline under these alternatives. Alternative E would affect less acreage so the effects would be less, than Alternatives No Action, A, B, and D; however, similar declines would occur on those acres allocated to intensive or restricted forest management. The existing level of dead and down material is higher than natural conditions due to fire suppression for several decades. The prescribed burn program would reduce these levels under all alternatives.

Under Alternative C large blocks of timber would be reserved (restoration and retention blocks). These large reserves along with riparian buffers would provide areas with high levels of natural recruitment of dead and down material. The Late-Successional/District Designated Reserves and Riparian Reserves under the Proposed Resource Management Plan would also provide natural recruitment.

The amount of dead and down material to be left in harvest units would vary among the alternatives. Whether any of these levels is adequate to support wildlife populations found in older forest stands is unknown and monitoring to assure achievement of this objective could be difficult.

Timber harvest on private lands provides little retention of coarse woody debris. The short rotations on these lands does not allow trees to grow large enough to provide future sources of large down logs. In the long term, the bulk of coarse woody debris habitat would occur on federal lands. Alternatives No Action, A, and B with short rotations would not retain large coarse woody debris and would increase negative cumulative effects on the landscape.

## **Riparian Wildlife Habitat**

For a complete discussion of the effects of the alternatives on riparian zones refer to the Effects on Riparian-Wetland Areas section in this chapter. The following discussion focuses on riparian-wetland areas as wildlife habitat. These areas along streams and water bodies provide important habitat for numerous wildlife species (see Appendix 3-C in the draft Resource Management Plan and Brown 1988) and are important for maintaining and restoring water quality.

Riparian zones vary in width depending on stream size, topography, vegetation type, and other factors.



Typical widths of riparian zones in western Oregon have been reported in the literature (Brown 1988).

The width of riparian management areas or Riparian Reserves established in the alternatives varies with larger streams receiving wider riparian management areas (see Table 2-1). The riparian management areas for 2nd, 3rd, and 4th order streams in Alternative A; 2nd and 3rd order streams in Alternative B; and class 2 streams in Alternative No Action are narrower than the associated riparian zones. The riparian management areas or Riparian Reserves in Alternatives C, D, E, and the Proposed Resource Management Plan attempt to protect much of the associated riparian area. Impacts on riparian areas could be expected even with the wider riparian-wetland areas. Franklin et al. (1981) found that microclimates near forest edges are exposed to more light and wind allowing the edges to become hotter and drier. The narrow riparian management areas under Alternatives A and B would not be expected to maintain the cool, moist conditions of riparian zones when adjacent forest stands are cut.

The objective of providing optimum microhabitat conditions for wildlife species using riparian zones would probably not be fully met under any of the alternatives for the smaller streams. Special protection is included in the Proposed Resource Management Plan to protect Special Status and Supplemental Environmental Impact Statement special attention species. These protected areas will also provide additional habitat for other riparian species. Riparian areas along 1st, 2nd, and 3rd order streams provide specific habitat conditions that complement the upland habitats. Some species, such as salamanders and frogs, could find adequate habitat conditions within the stream environment, but they also use the associated uplands and probably would not find suitable conditions with a narrow riparian-wetland areas reserved within an even-age harvest unit. It is unknown to what extent these species with limited mobility would be able to recolonize in headwater riparian areas if the population had moved from an area due to management activities.

Changes in plant species composition and habitat structure within retained stream buffers has not been well documented. It is likely that with increased solar radiation and long-term protection from fire, shade-intolerant species could become more prevalent. How this would affect wildlife habitat is unknown.

Cumulative effects to riparian habitat would be tied to effects or protection of the riparian areas. This discussion is covered in the Effects on Riparian-Wetland Areas section.

## Big Game

Management actions would have similar effects on all big game species (elk, deer, and antelope), therefore this section discusses the general effects first and then follows with a short discussion on each species. See Table 4-6 for a summary of effects by alternative.

Timber harvests would show a short-term benefit to big game habitat due to the forbs and grasses that respond to disturbed soil and open canopy. However, timber management practices would greatly reduce the amount of thermal cover available. Increased road access would further reduce usable habitat. Measures designed to protect the habitat of the northern spotted owl and other special status species would be beneficial to big game management by maintaining stands of old growth and mature timber to provide thermal cover which is important during hot summers and cold winters. Biodiversity silvicultural prescriptions, northern spotted owl reserves, and old growth reserves would reduce the negative effects of logging activity by reducing the area of affect.

Some silvicultural activities, such as vegetation control, would reduce available forage. Pre-commercial thinning and timber harvest could create slash and debris that would inhibit big game movement. Increased uses of this fiber or biomass could reduce these effects. The effects of these activities would vary according to the size, and distribution of the timber harvest units, and the level of intensity of timber management in each alternative.

Livestock grazing activities would have effects on big game that vary by alternative and intensity of grazing. There could be some competition for forage, especially in riparian zones that have increased numbers of cattle. Range management systems or improvements that help distribute cattle, such as fences and herding, would be beneficial under all alternatives. A salting program for livestock would also be beneficial by improving livestock distribution and could be of direct benefit to big game use.

Range developments that increase forage would have a beneficial effect on big game; although increased livestock use could create some competition for the forage. This competition would have more effects on winter ranges especially if important browse plants were eaten by the livestock and were not available for big game. Maintenance of the Pokegama Wild Horse Herd within the established 30 to 50 head appropriate management level would ensure that competition with big game would be minimal.



**Table 4-6. Estimated Effects<sup>1</sup> of Allocations by Alternative on Big Game.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	high	-	mod	-	mod	0	none	-	mod	+	low	+	low
Silvicultural Treatments	-	high	-	mod	-	mod	0	none	-	low	0	none	0	none
Forage Seeding	-	mod	+	mod	+	mod	+	low	+	mod	+	low	+	low
Grazing Management	0	none	-	high	-	low	0	none	+	low	+	low	0	none
Prescribed Fire	+	low	+	mod	+	mod	+	mod	+	mod	+	mod	+	mod
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	high	+	high	+	high
Road Management	+	low	-	high	-	high	+	low	+	mod	+	mod	+	low
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	high	-	high	-	low	+	low	+	low	-	low
Timber Resources	-	mod	-	low	0	none	+	low	0	none	+	high	+	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

Proposals to improve habitat would be beneficial under all alternatives. Brushfield rejuvenations, controlled burns, seedings of harvest units, and meadow restorations would increase important forage areas. Juniper management on the east side would protect existing browse areas or develop new areas. Retention of thermal cover areas would also have positive benefits.

Burns would have a beneficial effect due to vegetation response after a burn. A burn could be in response to timber harvest or silvicultural needs, or an underburn to reduce fire hazard or develop wildlife habitat. Fire-generated species are very important for forage on winter range. The amount of burning activities would be directly correlated with the amount of benefits. Wildfire could have a negative effect if it destroyed escape and thermal cover over large areas.

Special areas, such as areas of critical environmental concern, would increase the number of thermal cover areas available to elk and deer. Open roads and off-highway vehicle use would have a negative effect on big game populations due to increased harassment associated with these activities.

Riparian zones are important to big game for the forage, calving or fawning (birthing areas), and travel

corridors. Wider riparian management areas would provide more of these beneficial effects for big game.

Mineral exploration and development, quarry sites, waste disposal sites, and rights-of-ways could affect all big game areas but the effect would depend on the type, intensity, and season of the activity.

The proposed Salt Caves hydroelectric project on the Klamath River would affect big game winter habitat by the construction of fences, roads, and canals that would be barriers to habitat use. Road development in this area would also increase harassment during the critical winter use period.

Because the intensity of timber harvest is higher in Alternatives No Action, A, B, and D the negative effects on big game habitat from timber harvest and silvicultural activity would be higher than in Alternatives C, E, and the Proposed Resource Management Plan. The negative effects of the Alternative No Action would be the removal of hiding and thermal cover due to a high probable sale quantity and use of clearcuts. However, the increased forage made available in the harvest units would be a short-term benefit.

Measures designed to protect the habitat of the northern spotted owl and other old growth dependent

#### Chapter 4 - Environmental Consequences

species would be beneficial to big game management by maintaining stands of old growth and mature timber to provide thermal cover. Alternatives B and D provide some old growth reserves and would have less effects than Alternatives No Action or A. Alternatives C, D, E, and the Proposed Resource Management Plan would provide the most reserves and thermal cover. The effects would be less for Alternatives C, E, and the Proposed Resource Management Plan due to their silvicultural prescriptions, which retain more thermal and hiding cover.

Conversion of brushfield to timber would occur more in Alternatives No Action, A, B, and D, therefore the effects in those alternatives would be higher than in Alternatives C, D, E, and the Proposed Resource Management Plan. These conversions would reduce important browse area that are important to big game.

Seeding of timber harvest units for wildlife and watershed purposes would occur in all alternatives except No Action. Alternative E would have few benefits due to the small number of acres available for seeding. Benefits would increase substantially in all other alternatives. A higher percent of harvest units would be seeded under Alternatives C and the Proposed Resource Management Plan however more acres would be available under Alternatives A, B, and D.

The goal of Alternatives C, D, E, and the Proposed Resource Management Plan would be to reduce open road densities to 1.5 miles per section. This reduction in miles of open road from the current levels would increase big game habitat use and reduce stress due to less harassment. Under the Proposed Resource Management Plan there could be additional road closures if identified through the watershed analysis and subsequent National Environmental Policy Act decisions. Additional closures identified through this process would have benefits to big game.

The existing road closures in the Pokegama, Bryant Mountain, and Gerber areas would reduce effects from all activities on the winter range by greatly reducing harassment from vehicular activity. These closures would remain in effect under Alternatives No Action, C, D, E, and the Proposed Resource Management Plan. The closures would be removed under Alternatives A and B.

Riparian management would be beneficial to big game under all alternatives. Improved riparian vegetation and wetland protection would provide forage, calving and fawning areas, and escape cover. Water quality and distribution would be important to

herds on summer range. The riparian buffers increase from Alternative A to E and more protection is provided as the buffers increase. The Proposed Resource Management Plan Riparian Reserves would be the widest, with management to maintain important structures.

Land open to off-highway vehicle use would be the highest under Alternatives No Action, A, and B. There would be some negative effects, but the amount of off-highway vehicle use would probably be minimal.

Intensive recreational development of the Klamath River, especially for winter activities, would affect big game use due to increased disturbances. The proposed Salt Caves hydroelectric project on the Klamath River in Alternatives A and B would also affect the winter range.

Elk. The elk herds in the Klamath Falls Resource Area are restricted to specific areas and the effects would therefore only affect elk on a site-specific basis. The elk in the Surveyor Mountain area are only present in the summer and management activities would only affect the summer habitat. The size of this herd is increasing and continued growth is expected during the life of the plan. Timber management practices could greatly reduce the amount of thermal cover available for this summer herd. Recreational activities would only affect the summer range.

Elk use the area south of Highway 66 as a summer range, with increased use as winter range; therefore, the area could be affected by management activities in either season. The Pokegama closure would reduce the impacts from harassment during the winter closure period.

Swan Lake Rim is an important wintering area with elk moving up to 30 miles from their summer range to this winter range. Management of timber, livestock grazing, and fire would have the greatest effects on this herd (see the general discussion on Big Game).

The size of the elk herd in the Gerber area is currently small; however increases are expected during the life of the plan. Livestock grazing systems, range projects for forage enhancement, and wildlife projects for brushfield conversions would have the most (positive) changes in this habitat area. Juniper thinnings to release bitterbrush or create new openings, and seedings and controlled burns as proposed under the Proposed Resource Management Plan would have positive effects.

Small elk herds potentially occur on Bryant and Stukel Mountains. If small herds begin to form and

use these areas they would probably remain small due to outside influences (such as winter range on private land and fragmented land ownership patterns). Livestock grazing, timber management, and recreation development would affect these herds. The intensive livestock grazing of Alternatives No Action, A, and B would have negative effects on these herds. The effects of livestock grazing in Alternatives C, D, E, and the Proposed Resource Management Plan could have positive effects.

Elk populations would probably decline in Alternatives No Action, A, B, and D. The high density of open roads and lack of optimal thermal cover would have negative effects on the elk populations. In Alternatives C, E, and the Proposed Resource Management Plan forage quality or quantity could be a potential conflict with other resources. Under the Proposed Resource Management Plan, the BLM would follow the Oregon Department of Fish and Wildlife's management objectives for elk where compatible with ecosystem management. This would result in an increase in elk numbers both on the east side (south central unit) and west side (Keno unit). The BLM would adopt the elk management objectives as long as other ecosystem values were not jeopardized.

Cumulative effects of combined activities on BLM-administered lands and actions on other lands in the planning area are expected to result in a decline in elk habitat quality and in the numbers of elk under Alternatives No Action, A, B, and D. This expected decline would be due to anticipated high levels of road construction and low levels of thermal cover. An improvement in habitat quality and elk numbers would be anticipated under Alternatives C, E, and the Proposed Resource Management Plan despite less than optimal conditions on private lands. Elk habitat on private lands primarily consists of younger seral stages that provide abundant forage, currently increasing amounts of escape cover, and very limited amounts of thermal cover. In addition, road densities are often high and clearcuts are usually larger on private lands, resulting in reduced availability of usable habitat. Forage would likely be available for elk on private lands (because of intensive timber harvest) while BLM-administered lands would provide cover under Alternatives C, E, and the Proposed Resource Management Plan on adjacent private lands. Elk management objectives proposed by the Oregon Department of Fish and Wildlife will result in an increase in elk populations both east side and west side. Elk management objectives would be to increase current populations up to a level of 0.9 elk per square mile of habitat. These management objectives could have potential conflicts with timber management (retention of thermal cover) and grazing management

(forage competition among elk, cattle, and wild horses). These management objectives would have most potential conflicts under Alternatives No Action, A, and B.

**Deer.** Densities of black-tailed (west side) and mule deer (east side) are currently below the Oregon Department of Fish and Wildlife's management objectives for the planning area, with habitat conditions not expected to change significantly during the life of the plan. Thus, in the short term the abundance of deer would be similar under all alternatives. However, in the long term, black-tailed deer numbers would be expected to fluctuate in response to the boom-and-bust phenomenon of forage levels resulting from even-age management of forest lands in western Oregon (Brown 1985). This phenomenon is characterized by an initial high abundance of forage in response to overstory canopy removal, followed by low production of forage due to increasing shade from the overstory canopy. Deer populations tend to increase during periods of high browse availability and decline when forage is scarce. In the long term, Alternatives No Action, A, B, and D would probably maintain fluctuating populations of black-tailed deer. Alternatives C, E, and the Proposed Resource Management Plan would provide greater stability of black-tailed deer populations by reducing the amount of timber harvest and by increasing the availability of mature and old growth cover. Adequate amounts of forage to maintain current population levels should be available under Alternatives C, D, and E (and to a lesser extent, the Proposed Resource Management Plan), because of intensive forest management practices on intermixed private lands and the seeding of harvest units.

Livestock grazing management would have greater effects on east side mule deer populations. In the long term, Alternatives C, D, E, and the Proposed Resource Management Plan would have the greatest benefits to mule deer populations. These alternatives would help the Oregon Department of Fish and Wildlife build toward management objectives.

**Antelope.** Antelope trends would follow mule deer population trends on the east side. Cumulative effects of Alternatives No Action, A, and B on BLM-administered land and of actions on other lands in the planning area would likely perpetuate the boom-and-bust phenomenon because many private lands are currently managed under short timber harvest rotations or poor grazing systems. These short rotations are expected to continue in the future as timber companies respond to market demand. Cumulatively, more stable or increasing antelope populations would be anticipated under Alternatives C, D, E, and

the Proposed Resource Management Plan. Live-stock management would affect antelope in a similar manner as mule deer.

## Black Bear

Black bears are omnivores and forage heavily on fruits, green forage, tree cambium, and grubs and insects in down logs. Such foods tend to be more prevalent in earlier seral stages. However, Noble et al. (1990) recently pointed out that since black bears use large rootwads as den sites, they should also benefit from areas of mature forests for den sites and as summer thermal cover and downed logs for feeding sites. The authors further stated that policies that protect snags and dead and down woody material should improve bear habitat. Thus, moderate to high populations of bear would be anticipated in areas with a good mixture of earlier seral stages for food and mature stands for denning habitat.

As shown in Table 4-7, resource allocations and management activities that could have negative effects on black bear habitat by reducing overall habitat quality include: acres available for timber harvest, increased recreation activities, and mineral exploration and development would increase disturbances and human interactions; new road

construction and high road densities would reduce needed hiding cover and increase disturbance; elimination of clearcut harvesting and other actions that open up timber stands could reduce new forage areas. Resource allocations that could have positive effects on bear habitat include: high retention levels of snags, mature and old growth forest stands, and dead and down material could provide forage and denning sites; buffering riparian zones and special habitat features, such as rock outcrops and talus slopes, would provide more forage and den sites and hiding cover; and fish enhancement projects could provide a potential food base.

The higher timber harvest levels of Alternatives No Action, A, B, and D would result in a positive effect on bear by providing more forage from more acres in earlier seral stages. Alternatives C, E, and the Proposed Resource Management Plan would result in positive effects from fewer harvested acres and more mature timber stands, which provides needed denning areas and hiding and thermal cover. Conversely, in Alternatives No Action, A, B, and D negative effects would result from more road miles and higher road densities. In Alternatives C, E, and the Proposed Resource Management Plan, negative effects would result from fewer acres of early seral stage forage areas. All alternatives except A and B

**Table 4-7. Estimated Effects<sup>1</sup> of Allocations by Alternative on Black Bear.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	mod	-	low	-	low	+	low	-	low	+	high	+	low
Road Management	-	mod	-	mod	-	mod	-	low	-	mod	+	high	-	low
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	mod	+	low	+	low	-	mod
Recreation Development	0	none	0	none	-	low	-	low	-	mod	-	mod	-	low
Dead/Down & Snag Retention Levels	-	low	-	low	+	low	+	low	+	low	+	low	+	low
Special Habitat Feature Buffers	-	high	-	high	+	low	+	low	+	mod	+	mod	+	mod
Fish Habitat Improvement	+	low	+	low	+	low	+	low	+	low	+	low	+	low
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	high	+	high	+	mod
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).



would provide for road closures which could mitigate negative effects of high road densities.

In the short and long term, Alternatives No Action, A, and B would be expected to maintain or slightly increase current population levels of black bear, assuming that policies for snag and dead and down woody material were successfully implemented. Alternatives C, D, E, and the Proposed Resource Management Plan could provide slightly lower but similar populations based primarily on reduced availability of food materials found in early seral stages.

Cumulative effects could be similar or greater than those discussed above by alternative. On adjoining state, federal, and private lands, some of these effects have occurred and could continue due to higher timber harvest levels, higher road densities, less restrictions on off-highway vehicle use, and increases in other recreational use levels. The one factor that could potentially have the greatest single positive or negative effect would be hunting pressure and associated hunting regulations, which are set by the Oregon Department of Fish and Wildlife.

## Cougar

Cougar numbers are apparently dependent upon the abundance of deer since these animals are the major food source for cougars. Therefore, alternatives that benefit black-tailed and mule deer habitat should maintain or increase cougar numbers (see the discussion on deer). The number of cougar taken by hunting could affect cougar numbers on public lands.

Resource allocations and management activities that could have negative effects on cougar include: new road construction would increase road densities which would increase disturbance; high levels of timber harvest could reduce big game cover which could reduce the prey base; livestock grazing management activities would allocate more forage for livestock and reduce prey in cougar habitat; livestock over-grazing in deer winter range would reduce big game survival; the current animal damage control programs, which allows the taking of cougar, could reduce cougar numbers and/or their prey; high levels of forest and range land recreation and large areas open to off-highway vehicle use would increase disturbance; and mineral exploration and development would have the potential to disturb cougars or degrade their habitat. Resource allocations that could have positive effects include: silvicultural prescriptions could enhance deer habitat and thereby increase prey populations; buffering of special habitat features, such as rock outcroppings and cliffs, could provide hiding cover; and larger riparian management areas could increase cougar prey base. See Table 4-8 for a comparison of these allocations by alternative.

Alternatives No Action, A, and B would have the most significant negative effect on cougar. Allocations under these alternatives that would have a moderate negative effect due to the higher number of acres allocated for that activity would be for timber harvest, livestock grazing management, and off-highway vehicle management. Off-highway vehicle management could have a high negative effect on cougars and their prey in Alternatives No Action, A, and B and a moderate to low negative effect in Alternatives C, D,

**Table 4-8. Estimated Effects<sup>1</sup> of Allocations by Alternative on Cougar.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	mod	-	low	-	low	0	none	-	low	+	high	0	none
Grazing Management	-	mod	-	mod	-	low	-	low	+	low	+	low	+	low
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	mod	+	low	+	low	-	mod
Special Habitat Feature Buffers	-	high	-	high	+	low	+	low	+	low	+	mod	+	mod
Riparian Mgmt. Areas/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	high	+	high	+	high

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).



E, and the Proposed Resource Management Plan due to the number of acres open to off-highway vehicle use year-round and the number of acres that would be closed or restricted.

In the short term, Alternatives No Action, A, B, and D would be expected to reduce current cougar populations because deer populations would vary widely over time in response to variable forage levels and reductions in hiding and thermal cover that could result from the higher number of acres harvested under these alternatives. Alternatives C and E would provide progressive stability of deer numbers and would support potentially higher, more stable cougar populations. The Proposed Resource Management Plan would likely maintain present numbers of cougars. Positive effects would result under all alternatives from buffers on riparian zones.

Cumulative effects of the alternatives would be similar to or greater than those already discussed by alternative. On adjoining state, federal, and private lands, some of these effects have occurred and could continue due to more intensive timber harvest and higher road densities, less restrictions on off-highway vehicle use, and increases in other recreational use levels.

## Furbearers

Animals in this group include marten, fisher, badger, bobcat, ringtail, raccoon, skunk, otter, mink, and weasel. These animals are reliant on a variety of habitats and although certain management activities within the planning area could affect these species, most are affected by trapping more than any other activity.

Resource allocations and management activities that would have negative effects on these species include: acres available for timber harvest could affect needed old growth and mature stands and significantly alter habitats in other seral stages; new road construction could increase road densities; animal damage and predator control programs could reduce populations of some of these species; recreation developments could encroach on secluded habitat and increase encounters between humans and wildlife; off-highway vehicle management could open up large numbers acreages to habitat destruction; and fewer old growth retention acres could reduce the primary habitat of some species. See Table 4-9 for a comparison of these allocations by alternative. Riparian buffers would have positive effects by providing forage, water, and denning sources.

Table 4-9. Estimated Effects<sup>1</sup> of Allocations by Alternative on Furbearers.

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	high	-	mod	-	low	+	low	-	low	+	high	+	mod
Road Management	-	mod	-	low	-	low	-	low	-	low	0	none	-	low
Animal Damage Control	-	low	-	low	-	low	-	low	-	low	-	low	-	low
Waterfowl Predator Control	0	none	0	none	0	none	-	low	-	low	-	low	-	low
Recreation Development	0	none	0	none	-	low	-	low	-	low	-	low	-	low
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	low	+	low	+	low	-	low
Riparian Mgmt. Areas/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	high	+	high	+	high
Old Growth/Mature Retention	-	high	-	high	-	low	+	low	-	low	+	high	+	mod

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acre and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

In the short term, Alternatives No Action, A, B, and D would have negative effects on furbearers for most allocations. The only exceptions would be off-highway vehicle management in Alternative D, and riparian buffers in Alternatives No Action, A, B, and D. Allocations for harvest acres, riparian buffers, and retention of old growth and mature forest would positively affect furbearers under Alternatives C and the Proposed Resource Management Plan, while the other allocations would cause negative effects. Under Alternative E, minimal harvest acres, restrictive off-highway vehicle management, wide riparian buffers, and old growth retention would have a positive effect on furbearers.

Cumulative effects of the alternatives on furbearers are difficult to predict and would depend on long-term management of other private, state, and federal lands. Considering the trend of agencies moving toward management at the ecosystem level, furbearers would likely benefit over the long term.

## Osprey

Osprey abundance is most dependent on the availability of suitable nesting habitat and prey base near reservoirs, lakes, and major rivers and streams. Although ospreys usually nest in riparian zones, they also nest in upland areas near large bodies of water. Approximately 10 percent of ospreys in the planning area nest in upland areas. Upland nest sites would likely be affected by intensive timber harvesting to a

greater degree than nest sites in riparian zones which would receive some type of protection under all alternatives.

Resource allocations and management activities that could have potential negative effects to osprey habitat would include: recreational uses, such as off-highway vehicle use, and new road construction near nest sites would increase disturbance and reduce nest success; livestock grazing and timber activities could decrease water quality, which could affect the fish prey base; and snag retention levels could reduce nest and perch trees. Allocations that would have positive effects on osprey habitat would include: actions to improve water quality and enhance fish populations could increase the forage base; increased riparian buffers could provide greater nest habitat protection; and designating specific off-highway vehicle use areas could reduce potential disturbances to nest sites. See Table 4-10 for a comparison of these allocations by alternative.

In the short and long term, numbers of osprey would be expected to remain the same or decrease slightly under Alternatives No Action, A, and B; and increase under Alternatives C, D, E, and the Proposed Resource Management Plan. A significant amount of lake, river, and reservoir habitat for osprey nesting and foraging is available in the region; therefore, effects of the alternatives and actions on other public and private lands would likely have a positive cumulative effect on osprey throughout the region.

**Table 4-10. Estimated Effects<sup>1</sup> of Allocations by Alternative on Osprey.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Road Construction	-	low	-	low	-	low	0	none	0	none	+	low	0	none
Off-Highway Vehicle Management <sup>3</sup>	-	low	-	mod	-	mod	-	low	+	low	+	low	-	low
Snag Retention Levels	-	mod	-	mod	-	mod	+	mod	+	mod	+	mod	+	mod
Fish Habitat Improvement	+	low	+	mod	+	mod	+	mod	+	mod	+	mod	+	mod
Riparian Mgmt. Areas; Riparian Reserves	-	low	+	low	+	low	+	mod	+	high	+	high	+	high
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

## Accipiter Hawks

Effects on northern goshawks are discussed in the Special Status and Supplemental Environmental Impact Statement Special Attention Species section of this chapter. Other accipiters, such as Cooper's and sharp-shinned hawks, use dense, un-thinned timber stands for nesting (Reynolds 1983), primarily in the mid and late seral stages (20-90 years old). Thinnings in these stages can have adverse impacts on accipiters. Alternative E has relatively few acres allocated to timber management, so most stands would remain unthinned and provide habitat beneficial to accipiters. In Alternatives A, B, C, and D it is assumed that all stands on lands allocated to timber management would be thinned to increase timber yields and would have a greater impact. Although thinnings would be an important activity under the Proposed Resource Management Plan to promote development of old growth-like conditions, eventually these thinned stands would attain old growth-like conditions and thinning activities would decline in Late-Successional/District Designated Reserves. Fewer overall acres would be treated under Alternative E than in other alternatives. Thus, accipiters would likely have more suitable habitat in the long term under this alternative and in the Proposed Resource Management Plan (as thinning activities subside) compared to the other alternatives. Under the Proposed Resource Management Plan, thinning

will be permitted in the Matrix (General Forest Management Area) where applicable.

Resource allocations and management activities that could have negative effects on accipiters include: acres available for timber harvest could effect needed old growth and mature stands and significantly alter habitats in other seral stages; new road construction could increase road densities; off-highway vehicle management could open up large acreages to habitat destruction and disturbance of nest sites; mineral exploration and development could cause disturbance to nest sites; recreation developments could encroach on secluded habitat and increase human disturbance; higher snag retention levels could increase the prey base; and old growth retention acres could reduce the primary habitat of some species. Some positive effects would also result from the above mentioned actions in the different alternatives. See Table 4-11 for a comparison by alternative. Most of these allocations would have negative effects in Alternatives No Action, A, and B; a positive effect in C and E; and variable in D and the Proposed Resource Management Plan.

It appears that in all alternatives except E, accipiter populations would decline due to a lack of suitable nesting habitat, although the extent and significance of this decline is unknown. Under Alternative E, populations would remain similar to existing levels or would increase slightly.

**Table 4-11. Estimated Effects<sup>1</sup> of Allocations by Alternative on Accipiter Hawks.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	mod	-	low	-	low	+	low	-	low	+	high	+	mod
Road Management	-	low	-	low	-	low	+	low	-	low	+	high	+	low
Off-Highway Vehicle Management <sup>3</sup>	-	low	-	low	-	low	+	low	+	low	+	low	-	low
Recreation Development	0	none	0	none	-	low	-	low	-	low	-	low	-	low
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low
Snag Retention Levels	-	low	-	low	-	low	+	low	+	low	+	low	+	low
Old Growth/Mature Retention	-	mod	-	mod	+	low	+	low	+	low	+	mod	+	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

Numbers of Cooper's and sharp-shinned hawks would vary in accordance with the availability of unthinned habitat on BLM and adjacent lands within the planning area. The amount of thinning on adjacent (mostly private) lands are expected to be greater than current levels on BLM-administered lands under all alternatives. The cumulative effects of thinning on BLM-administered and private lands would adversely affect the amount of accipiter habitat and accipiter populations. Cumulative effects on accipiters would be detrimental under Alternatives No Action, A, and B. They would be less detrimental under Alternatives C, D, E and the Proposed Resource Management Plan. This is due to greater retention of existing older forest and greater allowance for future stands to develop to older forest conditions on BLM-administered lands. Additional habitat would also be available on adjacent Forest Service land due to recent spotted owl decisions (such as the Supplemental Environmental Impact Statement Record of Decision). Little habitat is anticipated on private lands.

## Prairie Falcon

Prairie falcons are dependent on steep cliffs and rocky outcroppings for nesting habitat. Their abundance is related to an undisturbed habitat and the associated prey base.

Resource allocations and management activities that could have negative effects on prairie falcon habitat include: road and off-highway vehicle management could increase disturbance near nest sites and foraging areas with higher road densities and larger

numbers of acres open to vehicles; cliff habitat (a special habitat feature) would be directly affected by the size of the buffers; and mineral exploration and development could affect cliff/talus areas if exploration were to occur. Some positive effects would also result from the above mentioned actions. See Table 4-12 for a comparison of allocations by alternative.

In the short and long term, these allocations would negatively affect falcon habitat in Alternatives No Action, A, B, and C, and mostly positive effects would result in Alternatives D, E, and the Proposed Resource Management Plan; prairie falcon populations would likely remain stable in Alternatives D, E, and the Proposed Resource Management Plan.

Cumulative effects of the alternatives would be similar to or greater than those discussed above by alternative. This could occur due to the listed management activities continuing at existing levels on adjoining private, state, and federal lands.

## Golden Eagle

The abundance of golden eagles in the region appears to be related to both the availability of early seral stages as foraging sites and mature/old growth timber as nesting habitat. The golden eagle is a fairly adaptable species and apparently can nest in small blocks of appropriate habitat.

Resource allocations and management activities that could have negative effects on golden eagles include: acres available for timber harvest, road management, and dead and down and snag retention levels could

**Table 4-12. Estimated Effects<sup>1</sup> of Allocations by Alternative on Prairie Falcon.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Road Management	-	low	-	low	-	low	-	low	-	low	+	mod	-	low
Off-Highway Vehicle Management <sup>3</sup>	-	low	-	low	-	low	-	low	+	low	+	low	-	low
Special Habitat Feature Buffers	-	high	-	high	-	mod	-	mod	+	low	+	low	+	low
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

## Chapter 4 - Environmental Consequences

reduce existing and potential habitat; and recreation development and off-highway vehicle management could increase the potential for human disturbance to nesting, roosting, and foraging sites. Allocations that could have positive effects include: riparian and special habitat feature buffers could enhance perch and nest sites and provide more forage areas. See Table 4-13 for a comparison of allocations by alternative.

In the short and long term, Alternatives C, D, and E would likely result in maintenance of current levels of golden eagles because present populations do not appear to be restricted by nesting cover. Foraging sites would likely be available on adjacent private lands even under these alternatives. Alternatives No Action, A, and B would likely result in a decreased abundance due to elimination of older forest stands. The Proposed Resource Management Plan would likely increase numbers of golden eagles in the planning area due to an increase in suitable nesting habitat.

### Red-tailed Hawk

The red-tailed hawk is able to successfully nest in almost any forest seral stage and is highly tolerant of most management activities. Generally, this species is not specifically inventoried, but nest site locations

are recorded when encountered and trend type of data is helpful in tracking their population.

Despite their adaptability, certain management activities can affect these hawks. Allocations that could have negative effects on these hawks include: acres available for timber harvest, road management, off-highway vehicle management, recreation development, and mineral exploration and development could disturb and/or reduce nesting and foraging sites. Allocations that could have positive effects include: snag and old growth and mature retention levels could provide nest and perch sites. See Table 4-14 for a comparison of allocations by alternative.

In the short and long term, most of these allocations would have a negative effect in Alternatives No Action, A, and B, variable in C, and mostly positive in D and E. The effects of the Proposed Resource Management Plan would be variable but hawk populations under the Proposed Resource Management Plan would be expected to remain stable or increase.

Cumulative effects of the alternatives and actions on other lands in the planning area would likely have no significant negative effect on red-tailed hawk populations.

**Table 4-13. Estimated Effects<sup>1</sup> of Allocations by Alternative on Golden Eagle.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Road Management	-	low	-	low	-	low	-	low	-	low	+	high	-	low
Dead/Down & Snag Retention Levels	-	low	-	low	-	low	+	low	+	low	+	low	+	low
Recreation Development	0	none	0	none	-	low	-	low	-	low	-	low	-	low
Special Habitat Feature Buffers	-	low	+	low	+	low	+	mod	+	mod	+	mod	+	mod
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	mod	+	high	+	high
Off-Highway Vehicle Management <sup>3</sup>	-	low	-	mod	-	mod	-	low	+	low	+	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).



**Table 4-14. Estimated Effects<sup>1</sup> of Allocations by Alternative on Red-tailed Hawk.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	low	-	low	-	low	+	low	-	low	+	high	+	low
Road Management	-	low	-	low	-	low	-	low	-	low	+	high	-	low
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	low	+	low	+	low	-	mod
Recreation Development	0	none	0	none	0	none	-	low	-	low	-	low	-	low
Snag Retention Levels	-	low	-	low	-	low	+	low	+	low	+	low	+	low
Old Growth/Mature Retention	-	low	-	low	+	low	+	mod	+	low	+	high	+	mod
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

## Neotropical Migrant Birds

There has been increasing concern in recent years about apparent widespread population declines of neotropical migratory bird species which migrate between Central/South America/Mexico and North America (French 1991). Causes of the declines are unknown, but possible reasons include loss of habitat on the breeding or wintering ranges, pesticide use, or other factors.

There are an estimated 87 species of neotropical migrants that occur within the planning area. Approximately 27 species are associated with early-seral coniferous forest stages; 26 with mid to late seral stages; 27 with mature conifer forest; 27 with hardwood forests; and 55 with riparian areas (Andelman and Stock 1993).

Based on analysis of neotropical bird population trends in Washington state (Andelman and Stock 1993), birds with suspected declining trends in the planning area include: killdeer, rufous hummingbird, barn swallow, golden-crowned kinglet, solitary vireo, orange-crowned warbler, yellow warbler, Wilson's warbler, chipping sparrow, song sparrow, and pine siskin. Some neotropical species indicate stable or

increasing trends, while for many other species, trends are unknown (Andelman and Stock 1993).

Based on habitat affinities of neotropical migrants, Alternatives No Action, A, and B, would provide more early-seral stage habitat and would favor 27 species of neotropical migrants (Andelman and Stock 1993). However, these alternatives would remove large acreages of conifer overstory which would have an adverse effect on 26 species associated with mid to late seral stages and 27 associated with mature stages. Of those associated with mature stages, it appears that Vaux's swift, Hammond's flycatcher, Swainson's thrush, black-throated gray warbler, Townsend's warbler, and hermit warbler would be the species which would be most impacted. Hermit warblers and Vaux's swifts are of special significance, since their breeding range is confined to conifer forests in the Pacific Northwest. In the short and long term, the Proposed Resource Management Plan followed by Alternatives E, D, and C respectively would favor 27 species associated with mature conifer forest. Fifty five species of neotropical migrants would likely benefit from progressively greater riparian protection under Alternatives C, D, E, and the Proposed Resource Management Plan. These species would have less habitat under Alternatives No Action, A, and B. In the short and long term,

species associated with hardwoods would likely have greater amounts of hardwood habitat under Alternatives C, D, E and the Proposed Resource Management Plan compared to Alternatives No Action, A, and B.

Of particular concern with this group of species is the cumulative effects of the alternatives in conjunction with the recent large-scale habitat changes created by federal and private timber harvest and land development in the Pacific Northwest along with habitat loss and pesticide use on the wintering grounds. It is quite likely that several of these species have experienced substantial population declines in the past few decades and are more vulnerable to future habitat changes. Long-term monitoring and inventories are lacking in the western United States. However, no major declines have been conclusively documented.

## Dominant Woodpeckers

Dominant woodpecker species within the planning area include the hairy, downy, and pileated woodpeckers; northern flickers; and red-breasted sapsuckers. All depend on excavating nest cavities in dead trees or in live trees with dead tops or branches. The downy and pileated woodpeckers require these nest snags to be located within forest stands. The other species may nest in snags in more open habitats. Pileated woodpeckers require hard snags, while other species often use soft, more decayed snags.

Effects of the alternatives on woodpecker habitat and populations were analyzed using a model developed by Neitro et al. (Brown 1985). The model is based on the numbers, sizes, and distribution of snags; the habitat in which they occur; and the habitat requirements of the species. The habitat information used in the model is based on age class distributions estimated from the TRIM-PLUS harvest model and the structure of stands described in the Biodiversity section. The results of the analysis for woodpeckers on BLM-administered lands are shown in Table 4-15. Although estimates in this table are based on the southern half of the Medford BLM District inventory, the west side of the Klamath Falls Resource Area is similar to the southern half of the Medford District and these numbers would approximate the west side of the Klamath Falls Resource Area. Snag inventory data for the east side is not available.

Under all alternatives, lands not allocated to intensive or restricted timber management would be managed to create or retain adequate numbers of snags to provide for 100 percent of optimum populations over the long term.

Resource allocations and management activities that could have negative effects on dominant woodpeckers include: the probable sale quantity could reduce potential future snag sources; acres available for timber harvest could affect the total acres available for woodpecker habitat. Allocations that could have a positive effect include: prescribed burning could create new snags by burning live trees; and riparian buffers could provide more forage and nesting habitat (see Table 4-14).

**Table 4-15. Estimated Effects<sup>1</sup> of Allocations by Alternative on Dominant Woodpeckers.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Allowable/Probable Sale Quantity	-	mod	-	mod	-	mod	+	low	-	low	+	high	+	low
Harvest Acres	-	mod	-	low	-	low	+	low	-	low	+	high	-	low
Prescribed Burning	+	low	+	low	+	low	+	low	+	mod	+	mod	-	low
Dead/Down & Snag Retention Levels	-	low	-	low	-	low	+	low	+	low	+	low	+	low
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	high	+	high	+	high

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0).

Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

Targets for all alternatives are based on the density of snags available compared with the number of snags needed to provide for optimum population levels. For example, if three snags per acre are required for optimum numbers of a species, a target of 60 percent of optimum population levels would correspond to approximately 1.8 snags per acre.

In the short term, Alternatives No Action, A, and B would result in a reduction in populations of woodpeckers on BLM-administered lands to about 45 percent of optimum levels. Alternatives C and the Proposed Resource Management Plan would maintain current levels and Alternatives D and E would result in slight increases mostly due to the large acreages not allocated to timber management (Alternative E only) and to higher snag retention levels.

In the long term, Alternatives No Action, A, and B would reduce population levels on BLM-administered lands below 40 percent of optimum levels. It is likely that these low population levels could not be maintained in the long term. Alternatives C, D, E, and the Proposed Resource Management Plan would result in increased population levels, well over 60 percent of optimum. It is likely that these higher levels would be stable over the long term, even considering the checkerboard ownership patterns throughout the west side of the planning area.

Under the Proposed Resource Management Plan, green tree retention requirements in the General Forest Management Area would be adequate to provide at least 60 percent of optimum population levels in the long term. However, some green trees may have to be killed or topped to provide snags.

One species, the pileated woodpecker, involves special concerns. This species requires large (at

least 15 inches diameter at breast height), hard snags in a forested condition for nesting. Many of the snags provided by the alternatives would decay quickly and become too soft to serve as suitable nesting material for this species. It is likely that the carrying capacity for this species is somewhat lower than the general-sized figures in Table 4-16.

Cumulative effects of the alternatives and actions on other lands in the planning area are expected to maintain low snag abundance and cavity-user populations. Few large trees have been left on private lands that have been clearcut in the last 30 years, except in state-mandated buffer strips. This situation is likely to continue in the foreseeable future. For most of the planning area, the overall carrying capacities would be approximately 50 percent of those shown in Table 4-16 assuming BLM-administered land comprises about 50 percent of the landscape. Over time this cumulative effect could cause woodpecker populations to reach extremely low levels on these lands. This would pose concerns for the long-term viability of these species under Alternatives No Action, A, and B. Under the other alternatives most species have a likelihood of maintaining populations over time.

## Other Cavity Users

Approximately 54 species within the planning area require tree cavities for portions of their life cycle (see Appendix 3-C in the draft). Most of these species depend on woodpeckers to excavate the cavities. Effects on habitat quality for cavity users would parallel the effects on the dominant woodpeckers.

Several species of cavity users are associated with more open habitats, such as meadows, grasslands, or clearcuts. These species, including western bluebird, American kestrel, house wren, and tree

**Table 4-16. Percent of Optimum Woodpecker Population on BLM -Administered Lands Within the Planning Area<sup>1</sup>.**

Year	NA	A	B	C	D	E	PRMP
10	54	45	46	53	61	57	52
100	54	32	38	75	69	83	70

<sup>1</sup> The PRMP numbers were not calculated using the Nietro model, and reflect the Biologist's estimate.)

swallow, generally use soft snags. Retaining soft snags in timber harvest units is difficult because these snags are often knocked or cut down for the safety of people working in the vicinity. The modeling used in the analysis assumed that half of the existing snags were lost during logging. Most of those successfully retained would be hard snags and less suitable for use by these species in the long term. Therefore, in all alternatives, the bulk of the habitat for these species would be in more permanent, open habitats such as meadows, oak grasslands, and open pine stands. Open, even-age harvest units would retain few soft snags in all alternatives, therefore, other cavity user populations would likely decline in all alternatives.

## Waterfowl and Sandhill Crane

Ducks, geese, and sandhill cranes depend on wetlands and open water for nesting and brood rearing habitat, and for feeding and resting habitat while migrating in the spring and fall. Many factors influence the availability of these habitats. Resource allocations and management activities that could affect waterfowl and cranes include: livestock grazing

management practices could reduce cover and aquatic vegetation; reservoir construction would provide more open water habitat; predator control for waterfowl could enhance nesting success; recreation development could increase human disturbance; off-highway vehicle management could open up or reduce many acres surrounding waterfowl habitat to disturbance; riparian buffers would provide more usable habitat; and water rights for wildlife could provide needed water when conflicts over use arise. Except for reservoir construction, riparian buffers, and water rights, most allocations indicated above would have a negative effect in the short and long term in Alternatives No Action, A, and B, and most would have a positive effect in Alternatives C, D, E, and the Proposed Resource Management Plan. See Table 4-17 for a comparison of these allocations by alternative.

Cumulative effects of the alternatives within the region would likely be positive considering the surrounding habitat located within state and national wildlife refuges in the Klamath Basin and the abundant resting and feeding habitat provided by thousands of acres of agricultural production surrounding the planning area.

**Table 4-17. Estimated Effects <sup>1</sup> of Allocations by Alternative on Waterfowl and Sandhill Crane.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Grazing Management and Livestock Enclosures	-	low	-	mod	-	mod	+	low	+	mod	+	high	+	low
Range Land Improvements (Reservoir Construction)	-	mod	+	high	+	high	+	high	+	mod	+	mod	+	high
Waterfowl Nest Predator Control	-	high	-	high	-	high	+	high	+	high	+	high	+	high
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	low	+	low	+	low	-	low
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	mod	+	high	+	high
Special Habitat Feature Buffers	-	high	+	low	+	low	+	mod	+	high	+	high	+	low
Water Rights for Wildlife	+	high	+	high	+	high	+	high	+	high	+	high	+	high
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

## Wild Turkey and Other Upland Gamebirds

Upland gamebirds that occur in the planning area include wild turkey, California and mountain quail, blue and ruffed grouse, mourning dove, chukar and red-legged partridge, and ring-necked pheasant.

Resource allocations and management activities that could have negative effects on populations of upland birds by reducing habitat quality or by removal and/or destruction of habitat include: acres available for timber harvest, vegetation control, and prescribed burning could destroy or degrade habitat quantity and quality; high levels of livestock forage utilization and higher numbers of acres open to off-highway vehicle use could reduce forage areas and nesting cover. Resource allocations that would have positive effects on upland birds include: forage seedings would enhance the food base; converting brush to hardwood would enhance ruffed grouse habitat; waterfowl nest predator control could reduce predation on these species; and riparian buffers would provide more cover, forage, water, and brood rearing habitat; and

prescribed burning could reduce decadent ground vegetation and stimulate new forb growth. See Table 4-18 for a comparison of allocations by alternative.

In the long term, Alternatives No Action, A, and B would likely maintain or slightly reduce wild turkey and upland gamebird populations and maintain or reduce habitat quality. In the short term, populations and habitat quality would be slightly reduced in Alternatives No Action, A, and B. In the short and long term, Alternatives C, D, E, and the Proposed Resource Management Plan would increase populations and enhance habitat.

Management actions on other public lands within the region would have a similar effect on habitat as those that occurred on BLM-administered lands. Cumulative effects of these actions and the alternatives would likely maintain or slightly increase current population levels and habitat conditions. If introductions of wild turkey and other gamebirds, which primarily occur on private and/or state lands, continue at current levels or increase, then these populations would likely increase. Effects to native gamebirds from these introductions is unknown, but not likely significant.

**Table 4-18. Estimated Effects<sup>1</sup> of Allocations by Alternative on Wild Turkey and Other Upland Gamebirds.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	low	0	none	0	none	+	low	0	none	+	high	0	none
Brush to Hardwood <sup>3</sup> Conversion	0	none	+	low	+	low	+	low	+	low	0	none	+	low
Prescribed Burning	0	none	0	none	0	none	+	low	+	low	+	low	+	low
Grazing Management (Forage utilization and riparian enclosure)	0	none	0	none	-	low	-	low	-	mod	-	mod	-	low
Forage Seeding	+	low	+	low	+	low	+	mod	+	mod	+	high	+	low
Waterfowl Nest Predator Control	0	none	0	none	0	none	+	low	+	low	+	low	+	low
Off-Highway Vehicle Management <sup>4</sup>	-	mod	-	mod	-	mod	-	low	+	low	+	low	-	low-
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	mod	+	high	+	mod
Pre-commercial Thinning <sup>5</sup>	+	high	+	low	+	low	+	low	+	low	0	none	+	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Beneficial primarily to ruffed grouse.

<sup>4</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

<sup>5</sup> Beneficial primarily to wild turkey.



## Amphibians

The abundance and diversity of amphibians is related to the availability of stable, properly functioning riparian habitat along streams and ponds, talus habitat, and dead and down woody debris, which helps retain moisture. Water quality is also an important factor (Nussbaum et al. 1983). The limiting factor for many amphibian species is the availability of free water and moist substrates on land for breeding (Nussbaum et al. 1983). The quality and quantity of riparian zones under the various alternatives is a major determinant in the quality of habitat for amphibians.

Resource allocations and management activities that would have negative effects on amphibians include: acres available for timber harvest, site preparation, and prescribed burning could reduce needed down wood habitat and older class decayed wood. Allocations that could have positive effects include: retention levels of dead and down woody material and snags would influence recruitment of new habitat; special habitat feature buffers, riparian buffers, and water quality standards. See Table 4-19 to compare how these effects vary by alternative.

In the short term, amphibian populations would be expected to increase under Alternatives C, D, E, and the Proposed Resource Management Plan compared to No Action, A and B due to increased protection and

improved condition of riparian habitats (see the Effects on Riparian Zones section), dead and down woody material retention levels, water quality standards, and special habitat feature buffers. In addition, Alternatives C, D, and E would provide increasing protection of upslope habitat which would protect more of the small, headwater streams important to species, such as the Pacific giant salamander and Cascade frog. The Proposed Resource Management Plan would provide the best distribution and protection of this habitat.

In the long term, riparian habitat conditions would improve under Alternatives C, D, E, and the Proposed Resource Management Plan because the streamside vegetation would be allowed to grow toward a mature, stable, undisturbed condition. Alternatives No Action, A, and B would result in declines of amphibian populations due to reductions in the amount of suitable habitat.

Cumulative effects of the alternatives and actions on other lands in the planning area would likely improve the condition of amphibians in the long term as riparian habitat grows into more stable, mature conditions on federal lands and as Oregon Forest Practices Act rules improve habitat on private land relative to the past few decades. However, regional impacts unrelated to forest land management (such as ozone thinning) are also concerns for these species.

**Table 4-19. Estimated Effects <sup>1</sup> of Allocations by Alternative on Amphibians.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	mod	-	low	-	low	+	low	-	low	+	high	-	low
Dead/Down & Snag Retention Levels	-	mod	-	mod	-	mod	+	low	+	low	+	low	+	low
Special Habitat Feature Buffers	-	high	+	low	+	low	+	mod	+	mod	+	high	+	mod
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	high	+	high	+	high
Water Quality Standards	0	none	0	none	+	low	+	mod	+	high	+	high	+	mod

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

# Effects on Special Status and Supplemental Environmental Impact Statement Special Attention Species

## Introduction

Special status plant and animal species in the planning area are listed in Chapter 3, Tables 3-19 and 3-20 and the Supplemental Environmental Impact Statement Special Attention plant and animal species are listed in Appendix E. The discussion of the effects of the alternatives on special status/special attention *plants* is followed by the discussion for special status/special attention *animals*. Due to the larger number of plant species, and generally lesser knowledge of their biology, they are discussed more broadly. The small number of special status/special attention animal species and moderate knowledge of their biology allows a discussion of each species.

Negative effects on federally listed and proposed species are not anticipated since they will be managed as required by the Endangered Species Act, as amended for example, the BLM would need approval from the U.S. Fish and Wildlife Service through conferencing before management actions would be implemented). Implementation of management actions designed to protect and increase populations of federally listed species would be expected to result in larger numbers and increased vigor of individuals, and more and larger populations.

Effects on other special status/special attention species would vary among the alternatives and relative to the category of the species and the administrative status (Oregon and California or public domain) of the land on which those species occur.

## Plants

Since comprehensive inventories have not been conducted for any special status/special attention plant species in the planning area, a precise prediction of the effects of the alternatives on special status/special attention plant species throughout the portion of the range included in the planning area is not possible.

**Sources of Effects.** Effects on special status/special attention plants and their habitats could result from a variety of resource management activities. The

largest effects would result from activities associated with timber and range management, recreation, and mineral exploration and development. Individual populations of special status plants are generally small in size and scattered. Within forests, timber harvest, pre-commercial and commercial thinning, and mortality salvage could alter or destroy habitats and populations of species through soil disturbance, soil compaction on skid trails, and increasing light levels and/or decreasing relative humidity as a result of decreasing canopy cover. Establishment of a permanent network of skid trails on most timber sale units could alter habitat permanently by maintenance of compacted soil conditions in those areas. Mechanical site preparation and ripping could affect habitats or populations through soil disturbance. Vegetation control could also affect habitats and individual populations through soil disturbance (mechanical) or non-target effects of herbicide application. Fertilization could affect special status/special attention plants by altering the nutrient status and nutrient cycling regime of a site, thus altering the competitive relationships between the special status/special attention species and other species. Road construction and development of rock quarries could destroy habitats and populations of species through disturbance and alteration of surface conditions.

Range management activities could affect habitats and populations of special status/special attention plant species through soil disturbance and/or compaction, physical damage from trampling, and direct consumption by livestock. Range improvements, such as water hole developments and fence lines, could alter or destroy habitat or populations by disturbing the surface of a site. Plant community and microhabitat features that support the existence of particular special status/special attention plant species could be altered by heavy utilization of forage by livestock, wild horses, and wildlife.

Mineral activity could destroy habitats and individual populations through disturbance of surface features from mineral exploration and development, and road construction.

Recreational development could affect habitat and populations through surface disturbance associated with hiking and horse trail development and use, especially where the area's attraction includes special status/special attention plants. High use during times of flowering could affect populations by trampling and collecting. Other recreational pursuits, such as off-highway vehicle use, that physically disturb the surface have affected special status plants in the past in the Lakeview District (outside the planning area).

## Chapter 4 - Environmental Consequences

Development of parking areas and other visitor facilities could affect habitats and populations through disturbance of surface features, and the trampling and disturbance associated with increased human visitation. Interpretation associated with recreation, however, could increase public awareness and sensitivity to native vegetation and ecosystems resulting in less inadvertent damage to special status/special attention species and their habitat.

Some species could benefit from disturbance activities to the extent that the activity creates habitat similar to that created by natural disturbance events. However, many noxious weed species are also adapted to disturbed conditions, particularly those created by human activities. Many of the exotic noxious weed species have been introduced without the organisms that may have limited their distribution and competitive ability within their native range; therefore, the noxious weed species may be most successful in competing for a disturbed site to the exclusion of the special status species.

Weed management activities could affect special status/special attention plants through soil disturbance from mechanical control methods, and through non-target effects of herbicide applications; however, control of noxious weed species could reduce competition for habitat and result in an increase in population size or occupation of potential habitats of a special status species.

Fire management activities could affect habitats or populations of special status/special attention plant species through surface disturbance associated with fire suppression activities, and through alteration of the nutrient status or nutrient cycling regime of a site from application of chemical flame retardants. Prescribed fires conducted outside the natural fire season could alter habitats and affect species that are adapted to fire in a particular season. Past fire suppression efforts in forested areas have eliminated fire as an ecosystem process and resulted in heavy hazard fuel loads. Management direction that does not reduce these fuel loads would result in conditions that would support high intensity, canopy replacing wildfire to which many of the native understory species are not adapted. These fires would alter habitat and negatively affect populations of special status/special attention plant species. Indirect fire suppression through removal of fine fuels on range lands by livestock has altered communities and habitats for special status species by eliminating fire as an ecosystem process. However, the underburning program common to all the alternatives, as well as the prescribed fire that would be conducted to meet other resource management objectives would reduce

hazard fuel levels and reintroduce fire as an ecosystem process. This could positively affect special status/special attention plant species that are adapted to a natural fire frequency and intensity.

Seeding or planting of native or exotic plant species to provide additional forage for wildlife or domestic livestock, or to stabilize disturbed areas, could alter habitat or affect populations of special status/special attention plant species. These actions could increase competition for occupation of a site and alter nutrient cycling regimes by the extensive use of nitrogen fixing species, such as legumes, in the plantings or seedlings.

Predator control that would be common to all the alternatives could have an effect on special status plant species. If control efforts reduce predator populations to levels that result in large increases of herbivore species (such as rabbits), then special status/special attention plant species could be negatively affected by the resulting increase in consumption of plant material.

**Alternative No Action.** Under the Alternative No Action, no significant effects on federal candidate, state listed, state candidate, or Bureau sensitive species would be expected because BLM policy would be to conserve these species through protection of their habitats and populations (as defined in Chapter 2). Effects on Bureau assessment species would be possible if funding or positions did not allow for surveys to detect these species in areas subject to management actions for other resources. Effects on Bureau assessment species from management actions could occur at the discretion of management.

Timber harvest and associated management actions would result in a landscape composed of even-aged stands of various sizes and ages, dominated by the early to late seral stages. Species mixes and relative species abundances typical of mature and old growth plant communities would be rare. Therefore, adverse effects to Supplemental Environmental Impact Statement special attention species would be expected, and the status of concern for these species would be expected to increase.

**Alternative A.** Under Alternative A, timber harvest and associated management actions, relatively high carrying capacities and relatively long seasons of use for livestock, and the intensive and widespread character of other soil-disturbing management actions would negatively affect the quality and quantity of habitats, and the population size of all special status/special attention plant species except those that are officially listed as threatened or endangered by the

U.S. Fish and Wildlife Service. Approximately 1,130 acres of known populations of special status species not including Bureau assessment species and an undetermined number of acres of unknown populations of special status/special attention plants would be subject to these effects. The resulting decline in abundance and distribution of these species across a portion of their range could contribute to the need for listing them as threatened or endangered under the Endangered Species Act. If listed, the BLM would be legally required to eliminate effects on the species, and to seek stabilization and recovery of the species. At this time, no officially listed plant species are known to occur on BLM-administered land in the planning area. Effects resulting from timber management activities under Alternative A would be detrimental to *Asarum wagneri* (a state candidate, Bureau sensitive species), and Supplemental Environmental Impact Statement Special Attention species, which seem to require old growth and mature forest habitat for development of healthy populations. The Effects on Biological Diversity section discusses the acres of old growth and mature forest lost or gained under each alternative. Over time, important habitats and populations of this species could be lost.

**Alternative B.** Under Alternative B, effects on special status/special attention plant species on Oregon and California lands would be similar to those under Alternative A, except that no effects would be expected on populations included in reserved old growth blocks. On public domain lands, effects on federal candidate, state listed, and Bureau sensitive species would not be expected due to protection of habitats and populations of these categories of species from surface-disturbing management actions. Approximately 860 acres of known populations of special status species, not including Bureau assessment species, and an undetermined number of acres of unknown populations of special status/special attention plants would be subject to effects under this alternative. Effects on *Asarum wagneri* and Supplemental Environmental Impact Statement Special Attention Species would be similar to those under Alternative A, therefore, the status of concern for these species would be expected to increase.

**Alternative C.** Under Alternative C, effects on special status/special attention plant species on Oregon and California lands would be similar to those under Alternative B, except that no effects would be expected on populations in old growth restoration and retention blocks. The total area included in restoration and retention blocks would be larger than that included in reserved old growth blocks under Alternative B; therefore, overall effects would be less than in

Alternative B since less populations would be affected by surface-disturbing management actions. On public domain lands, effects on federal candidate, state listed, state candidate, and Bureau sensitive species would not be expected due to protection of habitats and populations of these species from surface-disturbing management actions. Approximately 670 acres of known special status species, not including Bureau assessment species, and an undetermined number of acres of unknown populations of special status/special attention plants would be subject to effects under this alternative.

**Alternative D.** Under Alternative D, no effects on federal candidate, state listed, state candidate, or Bureau sensitive species would be expected because BLM policy would be to conserve these species through protection of their habitats and populations. Effects on Bureau assessment species could be possible if funding or positions did not allow for surveys to detect these species in areas subject to surface-disturbing activities for other resources. Effects on Bureau assessment species from management actions could occur at the discretion of management. Effects on Supplemental Environmental Impact Statement special attention species would be similar to those under Alternatives A and B, since no large reserves for the northern spotted owl would be established in the planning area. Therefore, adverse effects to some Supplemental Environmental Impact Statement special attention species would be expected, and the status of concern for these species would be expected to increase.

**Alternative E.** Under Alternative E, no effects on federal candidate, state listed, state candidate, or Bureau sensitive species would be expected because BLM policy would be to conserve these species through protection of their habitats and populations. Effects on Bureau assessment species could be possible if funding or positions did not allow for surveys to detect these species in areas subject to surface-disturbing activities for other resources. Effects on Bureau assessment species from management actions could occur at the discretion of management. The large amount of forest land that would be managed for the maintenance or restoration of old growth characteristics would provide the species composition and relative species abundances typical of those seral stages. Therefore, adverse effects would not be expected for species such as *Asarum wagneri* and Supplemental Environmental Impact Statement special attention species that occupy this type of habitat.

**The Proposed Resource Management Plan.** Under the Proposed Resource Management Plan, no effects



on federal candidate, state listed, state candidate, or Bureau sensitive species would be expected because BLM policy would be to conserve these species through protection of their habitats and populations. Effects on Bureau assessment species could be possible if funding or positions did not allow for surveys to detect these species in areas subject to surface-disturbing activities for other resources. Effects on Bureau assessment species from management actions could occur at the discretion of management.

The acreages of mature and old growth forest habitat would be maintained or increased in the long term so that species such as *Asarum wagneri* and Supplemental Environmental Impact Statement special attention species that occupy this type of habitat would be maintained or increased.

This Environmental Impact Statement also incorporates by reference the conclusions of the Supplemental Environmental Impact Statement. Specifically incorporated are conclusions in Appendix J2 of the Final Supplemental Environmental Impact Statement regarding its Alternative 9 (which is embedded in the Proposed Resource Management Plan) regarding bryophytes, fungi, lichens, and vascular plants. In summary, the Supplemental Environmental Impact Statement concluded that Alternative 9 would have the following consequences:

- ◆ Bryophytes - Alternative 9 affords fairly high protection to bryophytes. After application of mitigation, only three species remained of concern, and no Supplemental Environmental Impact Statement alternative would remove those concerns.
- ◆ Fungi - Mitigation measures added to Alternative 9 alleviate original concerns about many fungus species, but some risk of species extirpation remains, particularly for 147 rare and endemic species (most of which are not believed to occur on BLM-administered lands in the Klamath Falls Resource Area). This would be particularly true for 14 species for which cumulative effects remain a concern.
- ◆ Lichens - Mitigation measures added to Alternative 9 do not remove, but do substantially reduce, the risk of extirpation of lichen species, particularly for the 57 rare and endemic species (most of which are not believed to occur on BLM-administered lands in the Klamath Falls Resource Area). Some risk also may remain due to cumulative effects.
- ◆ Vascular Plants - Alternative 9, as mitigated, raises concerns about only 5 species, none of

which is documented to occur in BLM-administered lands in the Klamath Falls Resource Area.

Additionally, riparian zones were identified in the Supplemental Environmental Impact Statement as one of the important habitat components for special attention species of bryophytes, lichens, and vascular plants. Therefore, the larger amount of land allocated to Riparian Reserves in the Proposed Resource Management Plan will improve habitat conditions for these species relative to the other alternatives, except possibly Alternative E which would have a large amount of land allocated to restoration or retention of old growth conditions. The Supplemental Environmental Impact Statement did not consider riparian habitat as important for special attention species of fungi because the majority of the species evaluated occur on upland sites. However, fungi species associated with riparian areas were not well represented in that evaluation.

**Cumulative Effects.** No protection would be provided for special status/special attention plants on private lands. On neighboring national forest lands, many of the same special status/special attention plants are managed. Modeling to determine minimum viable populations and extinction probability has not been used for special status/special attention plant species documented on BLM-administered lands; therefore, it is not known what percentage of populations could be eliminated and still leave viable populations. If effects reduced populations below minimum viable levels and the species did not have a sufficient soil seed bank to support rapid recovery, the population would become vulnerable to extinction. If recovery did not occur, these long-term effects would result in an irreversible and irretrievable commitment of the resource leading to extinction of the species.

## Animals

### Northern Spotted Owl

Information on the habitat and populations of the northern spotted owl is discussed in Chapters 3/4 of the Supplemental Environmental Impact Statement. The discussions in this Environmental Impact Statement will incorporate the Supplemental Environmental Impact Statement by reference and further supplement Supplemental Environmental Impact Statement information by subsequent discussions specific to the Klamath Falls planning area.

The primary land management activity affecting northern spotted owl habitat is timber management.



Timber harvest and other management activities, including road construction, could remove or alter habitat and reduce habitat suitability; however, silvicultural treatments, such as thinning or fertilization, could speed recovery and regrowth of suitable habitat characteristics.

Other activities that could affect northern spotted owls or their habitat include mining, operation of machinery or other types of activity that could adversely affect nesting and reproductive success; granting rights-of-way or road use permits that could lead to habitat loss on federal and non-federal lands; and land exchanges that transfer habitat to private ownership which would then be subject to timber harvest, development, or other habitat loss.

Another substantial influence would be natural fire. Due to the high natural fire frequency in this planning area, a high turnover rate of habitat should be expected. Based on recent fire frequency rates it is predicted that there would be a 25 percent chance in 100 years of a stand-replacing fire. This would affect both nesting and dispersal habitat.

This section will discuss the effects of the alternatives on suitable owl habitat, dispersal habitat, critical habitat, and population levels.

## **Effects on Suitable Habitat**

BLM-administered forest lands in the planning area were evaluated to determine the availability of suitable habitat. Stands were classified based on timber operations inventory data, aerial photo interpretation, recent timber sale records, and field work to confirm habitat conditions.

Based on habitat information in the Interagency Scientific Committee report (Thomas et al. 1990), two categories of suitable northern spotted owl habitat were identified:

- ◆ **Category 1 Habitat.** Comprised of coniferous forest stands that satisfy the full complement of daily and annual needs of the owl for nesting, roosting, and foraging. These stands have a multi-layered canopy of several species of conifer trees with large trees in the overstory and an understory of conifers and hardwoods. Canopy closure exceeds 70 percent. There is a significant measure of decadence in the stand resulting in the occurrence of snags and broken-topped live trees along with dwarf mistletoe infections. The forest floor has substantial accumulations of large down woody material in the form of fallen trees.

- ◆ **Category 2 Habitat.** Comprised of coniferous forest stands that provide roosting and foraging opportunities for northern spotted owls, but may lack the necessary structure for consistent nesting or roosting. The roosting and foraging qualities are less than those described for Habitat 1 due to the reduced quality or complete absence of one or more of the components listed above (for example, the absence of large trees in the overstory, a reduced amount of down woody material on the forest floor, or a reduced canopy closure). Habitat 2 stands generally have less diversity in the vertical structure and have either limited or poorly defined multi-layer canopy structure. The understory must be somewhat open, allowing for owl movement and foraging. Canopy closure may not exceed 70 percent.

Currently (as of 1991) there are approximately 21,260 acres of Category 1 and 2 northern spotted owl habitat (as identified by biologists) in the planning area. There is a concern that large expanses of Category 2, without any inclusions of Category 1 to provide nesting groves, would not provide the same level of habitat suitability as if there were a mixture of the two habitat types. Within the planning area it is assumed there would be adequate interspersions of the two types of habitat due to riparian management areas, lands not suitable for timber production (that is, capable of growing trees, but not available for intensive management), and other lands not available for timber management (such as recreation sites) under all of the alternatives. Based on these assumptions the two categories were combined for all analytical purposes.

Future habitat suitability was estimated by projecting the growth of existing stands to account for growth and stand development that would increase the amount of suitable habitat over time. Reductions of suitable habitat were estimated by projecting the location and timing of future harvests, using the Ten-year Representative Timber Management Scenario for the short-term projections, and random selection from lands available for harvest in each alternative for the long-term projections. In addition, a natural disturbance-caused rate of habitat loss of 2.5 percent per decade for the Klamath Falls Resource Area was included in the long-term projections to account for fires, windthrow, and other factors. The projected development of suitable northern spotted owl habitat over time is shown in Table 4-20.

In estimating the rate of development of future northern spotted owl habitat, BLM biologists considered development of attributes needed for northern spotted owl habitat. Old clearcuts would eventually

**Table 4-20. Stand Ages or Period After Regeneration Timber Harvest, When Northern Spotted Owl Habitat is Attained.**

	Age or Period of Years
Unmanaged Stands <sup>1</sup>	
Naturally Established	80
Established by Even-Age Harvest	80
Managed Stands	
Even-Age (Rotation 100 Years or Less)	N/A
Restoration and Retention Blocks (Alt.C)	80
High Retention (35+% Basal Area [Alt. C + PRMP])	30
Low Retention (15-20% Basal Area [Alt. C])	80
General Forest Management Areas (PRMP)	30-80

<sup>1</sup> Also applies to existing stands managed under approaches designed to emphasize biological diversity.

develop the desired canopy closure, but would lack future nesting structures and structural diversity. Current clearcuts would still contain some nesting structures and diversity, but would take longer to develop these important attributes. However, in the Klamath Falls Resource Area many of the past logging units retained some structural diversity due to the partial cuts or selective harvests used. These types of practices would actually reach Category 2 northern spotted owl habitat sooner than a clearcut. In the Klamath Falls Resource Area, windstorms and lightning storms sometimes blow off the tops of trees and create potential nest structures. Mistletoe infestations also create potential nesting platforms as well as adding a structural diversity that is important for the prey base.

Density management in Alternative C's restoration and retention blocks and the Late-Successional/District Designated Reserve buffers and Riparian Reserves of the Proposed Resource Management Plan are areas not expected to have adverse effects on attainment or retention of suitable habitat conditions.

The analysis assumed that in the future nonfederal lands would have no suitable habitat. This is a worst case scenario, but it is likely that it would be true for the vast majority of those lands as it is highly likely they will be managed on harvest rotations ranging from 50 to 80 years. These short rotations would yield little, if any, habitat capable of sustaining significant numbers of reproducing spotted owls.

Changes in acres of northern spotted owl habitat protected by alternative are shown in Table 4-21. The

data used for this table was taken from timber inventories. *These inventories were designed to measure timber volume and growth potential, not existing owl habitat, and therefore there is some discrepancy in the amount calculated in these analyses and the amount reported by biologists through surveys.* This calculation was used for the purpose of comparing the alternatives and for consistency with the other western Oregon BLM districts in long-term predictions.

**Effects on Suitable Habitat within the Planning Area.** In the Klamath Falls Resource Area there are approximately 21,600 acres of Category 1 and 2 northern spotted owl habitat. The amount of suitable habitat for northern spotted owls would change over time under all of the alternatives. Under all alternatives, except E, suitable habitat would continue to be reduced in the short term in the planning area. This reduction would be primarily from timber harvest. Due to the level and type of proposed timber harvest, Alternative No Action would have the greatest effect on northern spotted owl habitat by the removal of such habitat.

The number of acres that would be entered per decade and the percentage of acreage that would be harvested in suitable habitat (Category 1 and 2) was estimated using Ten-year Representative Timber Management Scenarios. Since a Representative Timber Management Scenarios was not done for Alternative No Action and the Representative Timber Management Scenarios for the Proposed Resource Management Plan was not completed by the time these numbers were calculated, the percentage was estimated based on management prescriptions and

**Table 4-21. Suitable Spotted Owl Habitat by Alternative in the Klamath Falls Resource Area (1,000 acres)**

	Alternatives							
	Current <sup>1</sup>	NA	A	B	C	D	E	PRMP
<u>After 10 Years</u>								
Eastern Oregon Cascade Province	18.4	See Footnote 2	12	13	14	14	19	17
<u>After 50 Years</u>								
Eastern Oregon Cascade Province	18.4	See Footnote 2	1	5	21	8	34	16
<u>After 100 Years</u>								
Eastern Oregon Cascade Province	18.4	See Footnote 2	1	6	37	24	40	19

<sup>1</sup> These figures came from the State Office Geographic Information System calculations.

<sup>2</sup> Since Alternative No Action is not mapped in the BLM's Geographic Information System database, habitat data for the No Action could not be calculated, however the suitable acres would generally be less than the results projected for alternatives A and B due to the extensive harvesting that would continue.

goals. The amount of old growth and mature forest reserved would be the maximum amount of owl habitat available; however, not all acres identified as old growth or mature forest are or would be suitable habitat. See Table 4-22 for a comparison, by alternative, of changes in northern spotted owl habitat.

Alternatives A, B, and D would remove similar amounts of habitat annually. These alternatives start with a higher level of owl reserves than Alternative No Action and remove fewer acres per decade. After five decades, these alternatives would have cut most of the existing owl habitat that is not in reserve areas. Future habitat would have to rely on harvest units growing into habitat. Spotted owl populations would depend on large blocks of habitat located on adjacent BLM district or U.S. Forest Service lands for survival.

In the Klamath Falls Resource Area, Alternative E provides the greatest protection by reserving 75 percent of the existing habitat and affecting less than 10 percent of the commercial old growth timber per decade. Alternatives C and the Proposed Resource Management Plan would have less effects than Alternatives No Action, A, B, and D, because they would remove less habitat per decade than the other alternatives. The Proposed Resource Management

Plan would harvest timber within 3,800 acres of owl habitat per decade in such a way that the acres of suitable habitat would be maintained or increased.

After 50 years, Alternatives No Action, A, B, and D would all show continued drastic reductions in habitat. Alternatives C and E would show increases in suitable habitat. Alternatives C and the Proposed Resource Management Plan have silvicultural prescriptions that would allow Category 2 habitat to return very rapidly. By the fifth decade habitat would start to increase under Alternative C. Alternative E increases would simply be a matter of withdrawn lands developing suitable habitat through growth.

At 100 years, predictions show that Alternatives No Action, A, and B would have reached equilibrium, with potential habitat being cut as soon as or before it became suitable. Alternative D would show considerable increases in suitable habitat at 100 years, based on habitat projections calculated in the Geographic Information System. Alternatives C and E would continue to show improvement through the 100 year period. The Proposed Resource Management Plan would maintain approximately the same amount of habitat as currently exists. There will be slight reductions in habitat but due to the harvest prescriptions the

Table 4-22. Northern Spotted Owl Habitat Changes (Category 1 and 2) by Alternative.

	NA	A	B	Alternative		C	D	E	PRMP
Total Acres Entered per Decade	19,000	10,900	10,400	4,800	11,800	900	9,590 (3,800) <sup>1</sup>		
Percent of Harvest in Suitable Habitat <sup>2</sup>	(60)	59	52	92	37	0	(10)		
Acres of Owl Habitat Removed per Decade	11,400	6,400	5,400	4,400	4,400	0 (+600)	1,000		
Percent of Existing Habitat Removed in 1st Decade <sup>3</sup>	62	35	29	24	24	0	5		
Acres of Old Growth/ Mature Reserved	347	2,370	5,227	7,456	6,063	16,157	8,616		

<sup>1</sup> Acres in Late-Successional/District Designated Reserve Buffers that would be harvested per decade but still retain suitable habitat.

<sup>2</sup> Percentage figures derived from the ten-year Representative Timber Management Scenarios; those numbers in parenthesis were estimated.

<sup>3</sup> Based on suitable habitat, as corrected by biologists.

habitat will recover in 10 to 20 years. This results in fluctuations of habitat above and below the existing situation.

Even though the Proposed Resource Management Plan alternative provides adequate retention of northern spotted owl habitat, the Late-Successional/District Designated Reserves and buffers would only protect approximately 350 acres of owl habitat around each existing Late-Successional/District Designated Reserves containing owl habitat. More acres would be available, but at the outer edges of the provincial radius (1.2 miles) or in the state of regrowth or marginal habitat. This may not be enough habitat and could result in the loss of owl sites, especially in the short term or first few decades, until the regrowth of habitat is greater than the harvest.

In the Klamath Falls Resource Area, the other major effect to suitable habitat is from natural disturbances, mainly fire. With an expected fire rate for a stand-replacing fire at 25 percent in 100 years, the effects on habitat could be substantial.

Under Alternative No Action the suitable habitat would be removed by harvesting so fast that the effects of fire would probably be negligible. Under

Alternatives A, B, C, and D fire could account for noticeable effects, especially in the reserved areas. In Alternative E, fire or other natural disturbances would become the greatest effect on habitat. In a 100-year period under Alternative E, the Klamath Falls Resource Area proposes to harvest less than 1,000 acres of suitable habitat, whereas fire could be expected to remove approximately 5,000 acres of habitat. The Proposed Resource Management Plan was designed to allow some timber harvest but at a level that would allow enough retention of standing green trees to maintain or enhance old growth characteristics and species across the entire landscape. Forest health issues, especially fire in the ecosystem, will play a significant role in forest management decisions during the next ten years. Many forest stands throughout the northwest and California are presently at risk from insect infestation due to overstocking, the recent drought, and the removal of fire as a natural ecosystem process. Instead of withdrawing large blocks of land with little allowance for stand management or prescribed fire (Alternatives C and E), the Proposed Resource Management Plan was designed to manipulate the stands to reduce excessive mortality and forest health risks. This would maintain suitable northern spotted owl habitat in good condition. Prescribed fire will play an important role.



In conclusion, all of the alternatives would reduce the amount of suitable habitat within the planning area in the short term. The short term habitat loss would be most acute in Alternatives No Action, A, B, and D. Alternative E would not show a short term loss. The Proposed Resource Management Plan would maintain close to the existing amount of habitat.

Alternatives C, D, and E would result in increased levels of suitable habitat in the long term compared with the existing situation based on habitat projections calculated in the Geographic Information System. They would differ, however, in the spatial arrangement of the habitat. In Alternatives D, E, and the Proposed Resource Management Plan, the bulk of the suitable habitat would occur on lands not available for timber management or, in the case of the Proposed Resource Management Plan, within Late-Successional/District Designated Reserve buffers in which timber harvest would be limited. In Alternative C, approximately one-half of the suitable habitat in the long term would occur on lands not available for timber harvest and half on lands that would be available for timber harvest. This relative concentration of habitat within large areas could result in a lower degree of habitat fragmentation within the reserves, but it also implies that suitable habitat outside these areas may be scattered and more fragmented than current habitat.

These figures may be optimistic. Estimates of suitable habitat for Alternatives C and E are 77 percent and 84 percent respectively of total timber lands in the Klamath Falls Resource Area. Since the natural disturbance rate is 25 percent for 100 years, it would be expected that the total suitable habitat would be less than projected.

There is also a level of uncertainty associated with the growth model projections under Alternatives C and the Proposed Resource Management Plan. It is possible that stands under these management regimes would not attain suitable habitat as fast as projected, or conversely, they could reach those conditions in less time.

**Effects on Suitable Habitat in Western Oregon.** Based on the data in the *Final Draft Spotted Owl Recovery Plan*, BLM-administered lands currently provide approximately 14 percent of the suitable owl habitat in the region (Washington, Oregon, and Northern California), compared with 74 percent on U.S. Forest Service lands (U.S. Fish and Wildlife Service 1992). In Oregon, approximately 25 percent of suitable habitat occurs on BLM lands, 70 percent on U.S. Forest Service lands.

The projections shown in Table 4-23 indicate that in western Oregon, Alternatives No Action, A, and B would provide the least suitable habitat in the short and long term. Compared to the amount projected for U.S. Forest Service lands, these alternatives would not contribute substantial habitat in the state for the northern spotted owl.

Projections for the long term (100 years) show that Alternatives E and the Proposed Resource Management Plan would provide the most suitable habitat. Alternatives D and E would provide slightly less. All four of these alternatives would provide considerably more than Alternatives No Action, A, or B.

The contribution of BLM-administered lands to the present and projected availability of suitable habitat in the different provinces varies substantially (see Table 4-23 and Figure 4-1). Bureau of Land Management lands are most important in the Coast Range, where they currently contain more suitable habitat than U.S. Forest Service lands. Under Alternatives No Action, A, and B, suitable habitat on BLM-administered lands would be reduced significantly from current acres within the Coast Range province.

## Effects on Dispersal Habitat

Suitable northern spotted owl habitat provides for nesting, roosting, and foraging areas. Also of importance is the condition of dispersal habitat between the blocks of suitable habitat where nesting is expected to be concentrated. Providing forest habitat that permits movement of owls between nest habitat areas is important in facilitating replacement of deceased individuals with dispersing juveniles (Thomas et al. 1990, U.S. Fish and Wildlife Service 1992).

The Interagency Scientific Committee report (Thomas et al. 1990) suggested that adequate dispersal habitat across the managed landscape had two important component parts:

- ◆ Stands of high quality old growth forest located within riparian buffer strips, sensitive soil areas, and other areas not available for timber management; and
- ◆ Other stands of forested habitat that would allow northern spotted owls to move across the landscape and find some level of security until they found blocks of unoccupied suitable habitat.

The 50-11-40 standard was developed by the Interagency Scientific Committee to define a management prescription for dispersal habitat (Thomas et al.



**Table 4-23. Suitable Northern Spotted Owl Habitat on U.S. Forest Service and BLM-Administered Lands in Western Oregon by Alternative (1,000 acres).**

Decade/Province	USFS <sup>1</sup>	BLM					
<u>Current</u>							
E. Cascades	419	18.6					
Klamath	421	354.2					
Coast	239	294.8					
W. Cascades	1,780	281.0					
Total	2,859	948.6					
 <b>BLM Alternatives<sup>2</sup></b>							
	USFS	A	B	C	D	E	PRMP
<u>After 10 Years</u>							
E. Cascades	N/A <sup>3</sup>	12	13	14	14	19	17.7
Klamath	N/A	79	85	314	328	348	337.6
Coast	N/A	190	208	272	290	290	286.6
W. Cascades	N/A	198	210	262	260	277	258.4
Total	N/A	479	516	862	892	934	900.3
 <u>After 50 Years</u>							
E. Cascades	N/A	1	6	22	9	36	17.3
Klamath	N/A	55	129	297	315	483	392.1
Coast	N/A	58	119	154	304	321	414.5
W. Cascades	N/A	38	96	178	236	320	273.6
Total	N/A	152	350	651	864	1,160	1,097.5
 <u>After 100 Years</u>							
E. Cascades	1,062	1	7	39	25	42	19.6
Klamath	1,026	65	62	596	442	588	495.6
Coast	554	82	151	558	402	431	675.4
W. Cascades	2,618	50	119	454	286	402	390.0
Total	5,260	198	339	1,647	1,155	1,463	1,580.6

<sup>1</sup> U.S. Forest Service current owl habitat values from unpublished data in the Final Supplemental Environmental Impact Statement files.<sup>2</sup> Alternative No Action was assumed to be comparable to Alternative B, with the E. Cascades more similar to Alternative A.<sup>3</sup> Data not available.

1990). It calls for maintaining at least 50 percent of the land outside nesting habitat clusters in a forested condition, where stands have an average tree size of at least 11 inches in diameter at breast height and canopy closure of at least 40 percent. Although it is based on limited field data, it has been used as a method for assessing habitat for dispersal of spotted owls. The most commonly accepted method has been to use quarter-townships (nine square miles) as the scale on which to assess this standard.

**Effects on Dispersal Habitat within the Planning Area.** Within the planning area, there currently appears to be adequate distribution of patches and strips of high quality suitable habitat that meet the first requisite for dispersal habitat in most quarter-townships. This would continue in most alternatives,

however, Alternatives No Action, A, and B would result in the smallest acreage of these high quality habitat areas retained in all the alternatives because more forest lands would be available for timber harvest.

Currently there are 17 quarter-townships, out of a total of 28 (60 percent) within the planning area, that meet the 50-11-40 standard and 11 (40 percent) quarter-townships that do not meet the standard. One quarter-township may never meet the rule due to the lack of timber producing capability of the area. An analysis shows, that substantially all quarter-townships with more than 80 acres of BLM-administered lands would meet this standard in five decades under Alternative D and the Proposed Resource Management Plan.

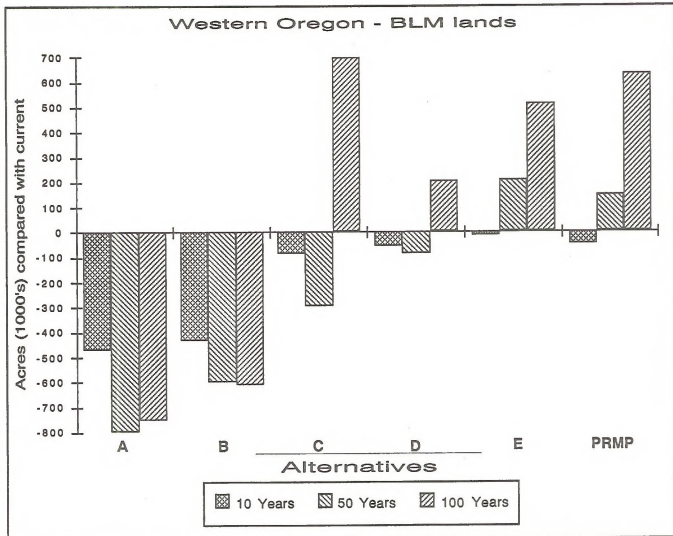


Figure 4-1. Changes in Suitable Owl Habitat (acres).

Alternatives No Action, A, and B would very likely result in a large number of quarter-townships within the planning area not meeting the 50-11-40 standard in the short or long term. This is due to the large amount of acreage available for and the intensity of timber harvest. Under the silvicultural systems in these alternatives, it would take approximately 50 years after a regeneration harvest before stands attained dispersal habitat characteristics. It is also important to note that under these alternatives, there would be few large blocks of suitable habitat available for concentrations of nesting spotted owls. It would be necessary for owls in this landscape to disperse long distances between reserve areas, such as wilderness areas and habitat conservation areas on U.S. Forest Service lands. The increased distances involved would greatly reduce the survival rates of dispersing owls.

Dispersal habitat would be substantially better under Alternative C, especially within the corridors where retention and restoration blocks and high retention silvicultural regimes would retain existing dispersal habitat and develop additional habitat. Outside the corridors, the low retention regime would contribute to dispersal habitat in the long term as regenerating stands age beyond 50 years following regeneration harvests. Stands in this regime would probably meet the 50-11-40 standard after approximately 50 or 60 years. Also, as in the previous alternatives, dispersing owls would be moving greater distances between U.S. Forest Service reserves than in Alternatives D and the Proposed Resource Management Plan. Some of the blocks under Alternative C would be large enough to successfully support pairs, but these would be much smaller than the large blocks called for in the Interagency Scientific Committee report.

## Chapter 4 - Environmental Consequences

Alternative D would essentially follow the Interagency Scientific Committee report recommendations and 50-11-40 dispersal habitat conditions would be maintained when planning timber harvest. Under this alternative, the number of quarter-townships meeting the 50-11-40 standard would increase until all quarter-townships with the potential to meet the standard do so (approximately 40 to 50 years). In the Klamath Falls Resource Area, dispersal rates under Alternative D would be similar to those of Alternatives C, E, and the Proposed Resource Management Plan.

Since Alternative E contains relatively little land available for timber harvest, the amount of dispersal habitat would likely approach the levels found in Alternative D. In most cases, the condition of the dispersal habitat would be far superior to the minimum levels found in Alternative D, but there could be localized areas that would pose minor obstacles to successful dispersal.

In Alternatives C and the Proposed Resource Management Plan the silvicultural prescriptions would allow current 50-11-40 conditions to be retained. Geographic Information System calculations for alternatives D and the Proposed Resource Management Plan predict an increase in the quarter townships that would meet the 50-11-40 in the first decade. This increase is based totally on the re-growth of habitat and may be optimistic.

Currently the majority of the units north of Highway 66 meet the 50-11-40 rule. This happens to coincide with the best northern spotted owl habitat and highest populations. Changes in other areas (south of Highway 66) would be very beneficial to provide a connection with the east Cascades province in Northern California.

In conclusion, Alternatives No Action, A, and B would result in the least effective dispersal habitat conditions of all the alternatives. Alternatives C, D, E, and the Proposed Resource Management Plan would result in generally comparable conditions in the long term, but dispersal distances would be greatest in Alternative C because of the positioning of the reserves in this alternative, reducing the effectiveness of providing for dispersal habitat. In addition, under Alternatives D and the Proposed Resource Management Plan most quarter-townships would be managed at the minimum level necessary to maintain 50 percent dispersal habitat on BLM-administered lands.

**Effects on Dispersal Habitat on BLM-administered Lands in Western Oregon.** The cumulative effects on dispersal habitat are perhaps more significant than

the specific effects of any one alternative. As mentioned earlier, the 50-11-40 criteria were originally developed as a standard to evaluate dispersal habitat across the landscape. Given the checkerboard ownership pattern across most of the planning areas, it is probable that even if the BLM attains 50 percent dispersal habitat on federal lands that the overall landscape would not contain much more than 25 percent dispersal habitat. This would result in a much lower rate of successful dispersal than would occur if 50 percent of the total landscape provided dispersal habitat. Whether this reduced level of dispersal habitat (50-11-40) is adequate to provide for successful dispersal of owls between suitable nesting areas is unknown. This situation was recognized by the Interagency Scientific Committee which recommended that the 50-11-40 standard be prorated by ownership for the first three years and then be reevaluated "as it applies to multiple-ownership areas" (Thomas et al. 1990).

A sensitivity analysis of dispersal habitat on all BLM-administered lands in western Oregon was conducted for the Proposed Resource Management Plan. Two projections were made, one using the timber harvest modeled for the Proposed Resource Management Plan, and another in which timber harvests maintained 50-11-40 conditions. The latter projections approximate the conditions under Alternative D. A total of 1,411 quarter-townships in western Oregon contain BLM-administered lands; of these 22 would never meet the 50-11-40 standard, leaving 1,389 that have the potential to develop those conditions.

The results indicate that under Alternative D, dispersal habitat would steadily improve from the existing condition and would fully meet the 50-11-40 standard in all 1,389 quarter-townships within 40 years. Under the Proposed Resource Management Plan, it would take longer because in some planning areas a short rotation length would allow harvesting of timber stands too early to enable the landscape to fully meet the 50-11-40 criteria. It is likely that in some western Oregon BLM planning areas it would never be possible to completely meet the 50-11-40 standard under the Proposed Resource Management Plan.

**Effects on Critical Habitat.** In 1992, the U.S. Fish and Wildlife Service designated 6.5 million acres as Critical Habitat for the northern spotted owl. The acres are arranged in 190 separate Critical Habitat Units across the states of Washington, Oregon and California. There are 76 Critical Habitat Units in Oregon totaling 3,257,000 acres of which 1,066,000 acres are administered by the BLM. Within the Klamath Falls planning area there is 1 Critical Habitat Unit with a combined BLM acreage of 18,450 acres.

All proposed actions that may affect lands designated as critical habitat would be consulted upon informally and, if necessary, formally with the U.S. Fish and Wildlife Service. For all alternatives, the BLM will not implement any action that would result in the destruction or adverse modification of critical habitat. As a result, there would be no adverse effects to designated critical habitat by any of the proposed alternatives. A sensitivity analysis of the effects of excluding all timber management activities from designated critical habitat is discussed in the Timber Resources section.

## **Effects on Populations**

This Environmental Impact Statement incorporates by reference the discussion and conclusions of the Final Supplemental Environmental Impact Statement relating to analysis of spotted owl population trends in Appendix J3 and Chapters 3/4, pages 3 and 4-212 to 237. An in-depth discussion of the significance and context of demographic studies in the conservation of the northern spotted owl is provided in the Final Supplemental Environmental Impact Statement pages 3 and 4-212 to 235. The following points summarize the key items from that discussion.

- ◆ The overall results of the demographic analysis by Burnham et al. (1994) were not surprising since the data was gathered during a time of habitat decline that was of sufficient concern to serve as a primary reason for the listing of the owl as a threatened species. Given this, it would have been surprising if the population had shown a stable or increasing trend.
- ◆ The result that should be of most concern is the declining rate of adult survival. It is not possible to know with certainty what specific actions could be implemented to reverse the declining rate of adult survival shown in the demographic studies. This information does argue for a relatively conservative plan for owls, but whether the demographic results of these studies call for any more measures than what are contemplated in the proposed Resource Management Plan cannot be known with any certainty. These data, however, would support a decision to adopt a markedly more conservative approach to owl management in the Proposed Resource Management Plan. (U.S. Department of Interior unpublished, and Thomas et al. 1990).
- ◆ Concerns were raised about whether the population of northern spotted owls could survive over the transition period until habitat recovery occurred. These were based largely on the

finding of declining survival rates for adult female owls and the contention that the population may already have or is about to pass a threshold from which it cannot recover. In order for the spotted owl to be at or near such a threshold that would be passed resulting in extirpation of the species from large parts of its range as a result of harvest under the Proposed Resource Management Plan, the following four conditions would have to be met.

- ◆ Owl populations would have to be declining throughout all or most of their range.
- ◆ Within the general areas where over all declines were seen, there would have to be no significant source areas that could provide for demographic rescue.
- ◆ The factor, or factors, causing the decline would have to be operating in a similar fashion throughout all or most of the range.
- ◆ The decline would have to continue as a function of habitat conditions until owl populations sizes and densities were reduced to the point that the populations could not recover.

There is additional discussion on each of these points in the Final Supplemental Environmental Impact Statement. This discussion concluded that 1) while there is strong reason to believe that the owl populations have declined across much of their range, there is ample reason to believe that the pattern of population change is not the same everywhere, 2) there are areas within the range of the owl with characteristics thought to be important to the productivity and stability of local populations and that such areas could act as sources for the owl population even in the face of an overall decline. Many of these areas are within the Late-Successional/District Designated Reserve designated by the Proposed Resource Management Plan, 3) it is unlikely that a single factor, with the exception of habitat loss, is primarily responsible for the declines in the owl population across the range. With the full range of environmental variability represented within reserves, there is reason to believe that owl population performance will vary in both positive and negative ways throughout the range. Given this it would be inappropriate to make a simple extrapolation from the current estimated rates of decline in the owl population to single future projection of irreversible decline, and 4) there is no part of the demographic studies that link them to either historic or projected rates of decline and there is no other evidence that the owl population losses will accelerate in the future or no empirical or theoretical basis for believing that the current habitat condition or condition of the owl population represents a unique threshold point.



## Chapter 4 - Environmental Consequences

The draft Resource Management Plan/Environmental Impact Statement used a spatially explicit population model by McKelvey (1992) to evaluate the likely response of a model-generated owl population to a varying set of habitat situations characteristic of the range of alternatives. This model was subsequently used in the Supplemental Environmental Impact Statement analysis. This Environmental Impact Statement incorporates the discussion of that application found in Appendix J3 of the Supplemental Environmental Impact Statement. As stated in Appendix J3, "Our results support the conclusions reached by the Forest Ecosystem Management Assessment Team in assessing likelihood of habitat conditions to provide for stable and well-distributed populations (measured against the owl's historic range) on federal lands over both the short and long term." The authors also stated that "The Forest Ecosystem Management Assessment Team based their ratings on an assumption that the amount and distribution of habitat would be sufficient to support a large enough population of owls to prevent passing an extinction threshold. Our simulation results do not prove this assumption correct (nor could they), but they do lend support to it for Alternatives 1 and 9 under the most likely rule sets." The standards and guidelines of the latter were embraced by the Proposed Resource Management Plan.

### Summary for Spotted Owl

Analysis of the information on population levels and the quantity and arrangement of suitable habitat on the landscape indicated that the alternatives in this Environmental Impact Statement would likely have different outcomes for sustaining owl populations on BLM-administered lands in western Oregon and contributing to the long term stability (recovery) of populations within the range of the owl. For Alternatives No Action, A, and B the outlook for sustaining owls on the BLM-administered lands is near zero, thus virtually eliminating any contribution to the overall spotted owl population stability in the region. For alternatives C, D, E, and the Proposed Resource Management Plan, the likelihood of sustained populations on BLM-administered lands is greatly increased and there would be an important contribution to the overall spotted owl population stability in the region. The contribution to recovery associated with each alternative varies because of the amount and distribution of suitable habitat and/or the amount and distribution of dispersal habitat in the first several decades of implementation. The level of contribution to the recovery of the spotted owl for Alternative D is about the same as implementation of the Final Draft Recovery Plan for the Northern Spotted Owl (U.S.

Department of the Interior 1993). On the other hand, the Proposed Resource Management Plan would provide a somewhat higher level of contribution to the recovery of the owl than the Final Draft Recovery Plan. The Proposed Resource Management Plan contribution as compared to D, is greater due to the large increase in suitable habitat that occurs. In the long term, the Proposed Resource Management Plan will exceed Alternative D in amount of suitable habitat and overall habitat capability. The lower expectation of that silviculture will be successful in recreating habitat over large portions of the landscape. Under Alternative E, the allocations perpetuate the habitat conditions of today and do not afford opportunity for regrowth of habitat in areas presently deficient, thus resulting in a habitat area of lesser extent than Alternatives C, D, and the Proposed Resource Management Plan.

### Bald Eagle

The assessment of effects on bald eagle habitat is based on the number of potential bald eagle breeding and winter roosting sites that would be maintained under each alternative. Bald eagle sites (including seven existing nest sites and one potential nest site) that are identified in the *Pacific Bald Eagle Implementation Plan* (Washington Department of Wildlife 1990) would be protected under all alternatives. There are other potential habitat sites (that is, sites not identified under the implementation plan) that would be retained and protected under each alternative.

Resource allocations that could have negative effects on bald eagles include: acres available for timber harvest, road management, and dead and down and snag retention levels could reduce existing and potential habitat; and recreation development and off-highway vehicle management could increase potential for human disturbance to nesting, roosting, and foraging sites. Allocations that could have positive effects include: waterfowl nest predator control would increase the prey base; buffers on special habitat features and riparian zones could enhance perch and nest sites and provide more forage areas. See Table 4-24 for a comparison of these allocations by alternative.

In the short term, Alternatives No Action, A, B, and D would provide the fewest number of potential habitat sites because they provide less protection for old growth and mature forests and, except for Alternative D, riparian zones. In contrast, Alternatives C, D, E, and the Proposed Resource Management Plan would provide more potential habitat sites based on increased protection of old growth and mature habitat



Table 4-24. Estimated Effects<sup>1</sup> of Allocations by Alternative on the Bald Eagle.

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Road Management	-	mod	-	mod	-	mod	-	low	-	mod	+	high	-	low
Waterfowl Nest Predator Control	-	mod	-	mod	-	mod	-	mod	+	low	+	low	-	mod
Dead/Down and Snag Retention Levels	-	low	-	low	+	low	+	low	+	low	+	low	+	low
Recreation Development	0	none	0	none	-	low	-	low	-	mod	-	mod	-	low
Special Habitat Feature Buffers	-	high	-	high	+	low	+	low	+	mod	+	mod	+	mod
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	high	+	high	+	mod
Off-Highway Vehicle Management <sup>3</sup>	-	low	-	low	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

and riparian zones. Under all alternatives, bald eagle populations on BLM-administered land would probably remain at current levels due to protection of all existing and some potential habitat.

In the long term, the availability of suitable bald eagle habitat would also depend on the amount of habitat allowed to regrow into old growth and mature forest habitat and in riparian areas. Alternatives C, E, and the Proposed Resource Management Plan would provide some of this habitat in the long term, whereas Alternatives No Action, A, B, and D would provide very limited potential habitat. Bald eagle populations would likely increase in the long term under Alternatives C, E, and the Proposed Resource Management Plan due to increased availability of mature and old growth forest.

The proposed Salt Caves hydroelectric project could be constructed under Alternatives A and B and could potentially effect bald eagles. The Federal Energy Regulatory Commission Final Environmental Impact Statement (1990) lists several proposed measures that would protect nesting bald eagles during construction and operation of the project. Long-term effects of the project on wildlife can be found in the Federal Energy Regulatory Commission Environmental Impact Statement and short-term effects are summarized in Appendix N.

Cumulative effects of Alternatives No Action, A, and B and actions on other lands in the planning area would likely maintain current low levels of bald eagle habitat and populations. Based on current Oregon Forest Practices Act riparian regulations, bald eagle habitat and populations are not expected to increase from already low levels on private lands in either the short or long term. Since additional older forest and riparian protection would be available under Alternatives C, D, E, and the Proposed Resource Management Plan (assuming no change in bald eagle habitat on private lands), the cumulative effects would result only in slightly higher amounts of bald eagle habitat and populations within the planning area. From a regional perspective, similar levels of habitat protection on other federal lands (for example national forests and other BLM districts) would tend to result in modest increases in bald eagle habitat and populations over time.

## Peregrine Falcon

Under all alternatives, the peregrine recovery plan (U.S. Fish and Wildlife Service 1982) would be followed and adequate protection would be given to the one known historic nest site to prevent disturbance that would result in reproductive failure.

Resource allocations and management activities that could have negative effects by causing disturbance near peregrine nesting and foraging sites include: road management, recreation development, mineral exploration and development, and off-highway vehicle management. Allocations that could have positive effects include: special habitat feature buffers could provide more protection for cliff nest and perch sites; and riparian buffers could enhance habitat for prey base. See Table 4-25 for a comparison of these allocations by alternative.

Potential nesting sites in cliff habitat (a special habitat feature) would be afforded no protection under Alternatives No Action and A. It is possible that future nesting opportunities would be lost through development of rock quarries, road construction, recreational development, or other activities. Potential nest site protection would be very limited under Alternative B and adequate under Alternatives C, D, E, and the Proposed Resource Management Plan, which could allow for future population expansion and ultimately contribute to the de-listing of the species.

The proposed Salt Caves hydroelectric project could be constructed under Alternatives A and B and could potentially affect peregrine falcons if the historic nest were to be occupied or if a new nest site was found near the project. The Federal Energy Regulatory Commission Environmental Impact Statement (1990) lists several proposed measures that would protect nesting falcons during construction and operation of

the project. Long-term effects of the project on wildlife can be found in the Federal Energy Regulatory Commission Environmental Impact Statement and short-term effects are summarized in Appendix N.

The effects of management activities on the falcon's prey base is not well understood. Presumably, managing the landscape to maintain a diverse and abundant community of avian prey species would benefit peregrines. Alternatives No Action, A, and B would probably have a negative effect on prey availability. Important prey species, such as northern flickers (which require snags), and American robins (which feed extensively on hardwood berries and fruits), would probably be reduced in number. In general, these alternatives would result in less diverse habitat conditions which could adversely affect prey abundance. The effects of Alternatives C, D, E, and the Proposed Resource Management Plan is unclear, but it is likely that there would be adequate prey to support peregrine populations in the short and long term.

## Northern Goshawk

This species appears to be closely tied to mature and old growth conifer forests. Effects on northern goshawk habitat are closely tied to the amount of old growth and mature habitat, which varies by alternative.

Resource allocations and management actions that could have negative effects by causing disturbance

Table 4-25. Estimated Effects<sup>1</sup> of Allocations by Alternative on the Peregrine Falcon.

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Road Management	-	low	-	low	-	low	-	low	-	low	+	high	-	low
Special Habitat Feature Buffers	-	high	-	high	-	low	+	low	+	low	+	low	+	low
Recreation Development	0	none	0	none	-	low	-	low	-	low	-	low	-	low
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	low	+	low	+	low	-	low
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

near nesting and foraging sites include: road and off-highway vehicle management; and acres available for timber harvest could reduce adequate habitat. Allocations that could have positive effects include: riparian buffers could enhance habitat for the prey base; high snag and old growth and mature retention levels would provide nesting, foraging, and perch sites. See Table 4-26 for a comparison of these allocations by alternative.

Alternatives No Action, A, B, and D would retain suitable habitat only on lands not allocated to timber management. Goshawk populations would be expected to decline substantially. The low retention regime in Alternative C would remove habitat for 70 to 100 years after a regeneration harvest. It is unclear whether the high retention prescriptions in Alternative C would retain adequate habitat structure to support goshawk nesting. With the opening of the canopy and the frequency of disturbances, it is likely that these areas would be greatly diminished in their carrying capacity for this species. The retention and restoration blocks in Alternative C would, in many cases, be capable of supporting isolated pairs of goshawks. The partial cut regimes of Alternatives C and the Proposed Resource Management Plan probably would not retain suitable goshawk nesting habitat in the Matrix (General Forest Management Areas). The large blocks of older forest reserved in Alternatives E and the Proposed Resource Management Plan would be capable of supporting multiple pairs for a relatively long time. With the minimal

harvest in Alternative E, goshawk nesting would be greatly enhanced.

In the short term, Alternative E would result in stable or slightly higher population levels compared with the existing situation; Alternatives C and the Proposed Resource Management Plan would result in slightly lower populations; and Alternatives No Action, A, B, and D would result in slightly larger population declines. In the long term, Alternatives No Action, A, B, and D would result in substantial population declines, possibly large enough to contribute to the need for listing the species as a threatened or endangered species under the Endangered Species Act; the other alternatives would maintain populations at or slightly above the existing situation. Additional habitat would also be available on adjacent Forest Service land as a result of decisions made in the Supplemental Environmental Impact Statement. Little habitat is anticipated on private lands.

## Western Sage Grouse

Western sage grouse, found only on the east side of the planning area, are at the western most part of their range. Populations, which have historically been low, have been declining. Although activity in lek sites has occurred in the recent past (based on finding broods in the summer), there has been none documented in surveys done during the last several years.

**Table 4-26. Estimated Effects<sup>1</sup> of Allocations by Alternative on the Northern Goshawk.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	mod	-	low	-	low	+	low	-	low	+	high	+	low
Road Management	-	mod	-	mod	-	mod	-	low	-	mod	+	high	-	low
Dead/Down & Snag Retention Levels	-	low	-	low	+	low	+	low	+	low	+	low	+	low
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	mod	+	low	+	low	-	mod
Riparian Mgmt. Area; Riparian Reserve	+	low	+	low	+	low	+	mod	+	high	+	high	+	mod
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

Resource allocations and management activities that could have negative effects on sage grouse populations and habitat include: vegetation control could remove needed habitat; recreation development and off-highway vehicle management could reduce nesting and brood rearing habitat and open up more acres to habitat destruction; high allocations for livestock grazing could remove bunchgrasses or woody species that are essential for nesting cover. Resource allocations that could have positive effects include: waterfowl predator control could remove potential predation on grouse nests and young; buffers on riparian zones and special habitat features would enhance brood rearing habitat by providing water and forage (see Table 4-27).

All alternatives except the No Action would provide protection of lek sites with buffers and seasonal restrictions on surface-disturbing activities. The degree of protection of lek sites varies by alternative. Alternatives A and B would provide the least protection; Alternatives C, D, and the Proposed Resource Management Plan a moderate degree; and Alternative E the highest amount of protection. Considering all allocations together, Alternatives No Action, A, and B would likely have a negative effect on sage grouse habitat and populations; and Alternatives C,

D, E, and the Proposed Resource Management Plan would have a positive effect. Competition from introduced species (such as turkeys) could have a negative effect.

In the short term, none of the alternatives would show a significant positive effect on western sage grouse because of the time it would take for habitat or populations to begin to recover. In the long term, Alternatives C, D, E, and the Proposed Resource Management Plan would likely enhance sage grouse habitat and populations due to improvements of range conditions and riparian zones, and greater protection of lek sites. Because sage grouse in the planning area are at the edge of their range and populations may have always been low, any actions taken to increase their numbers may not show a significant change. Cumulative effects of the alternatives and actions on other lands within the region would likely maintain at least the current low level of sage grouse populations and habitat.

## Townsend's Big-eared Bat

The primary habitat features required by this species are the caves used for roosting and as maternity colony sites.

Table 4-27. Estimated Effects<sup>1</sup> of Allocations by Alternative on the Sage Grouse.

Allocation <sup>2/3</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Forage Seeding	+	low	+	low	+	low	+	mod	+	mod	+	high	+	low
Waterfowl Predator Control	-	low	-	low	-	low	+	mod	+	mod	+	mod	+	mod
Recreation Development	0	none	0	none	0	none	0	none	-	low	-	low	0	none
Off-Highway Vehicle Management <sup>4</sup>	-	mod	-	mod	-	mod	-	low	+	low	+	low	-	low
Grazing Management and Livestock Enclosures	-	low	-	low	-	low	-	low	-	low	+	low	-	low
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	mod	+	mod	+	high	+	high
Special Habitat Feature Buffers	-	low	+	low	+	low	+	mod	+	mod	+	high	+	mod

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Applicable only to east side habitats.

<sup>4</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1)

Resource allocations and management activities that could have negative effects by causing disturbance near the known sites include: off-highway vehicle management, timber harvest, recreation development, and mineral exploration and development. Riparian buffers and special habitat feature buffers could have positive effects by protecting the site from disturbance. See Table 4-28 for a comparison of these allocations by alternative.

Under Alternatives No Action and A no specific protection would be provided for Townsend's big-eared bat habitat. Timber harvest, mineral exploration and development, or other actions around active sites could result in alterations of the air flow into the caves, and/or cause noise-related disturbance that could reduce the suitability of a site either as a summer roost and nursery colony or for winter hibernation. In addition, new road construction could increase the chances that human disturbance would also interfere with the bats' use of these sites. Under these alternatives the bat population would probably decline.

Under Alternatives B, C, D, E, and the Proposed Resource Management Plan, the known sites are afforded a 20-acre protective buffer and in Alternatives C, D, E, and the Proposed Resource Management Plan, some management activities are restricted within ¼ mile of occupied sites. This would likely reduce or eliminate the negative effects of timber harvest or mineral activity around cave entrances, but the potential for disturbance from other

activities would still be an important consideration. Under these alternatives the population would likely remain stable or decline slightly.

Under all alternatives, recreational use near the occupied maternal site in the Klamath River canyon would be restricted to avoid disturbing the bats. No restrictions on commercial or private boating on the Klamath River is proposed under any alternative; however, a seasonal closure of the shoreline around the maternal colony is common in all alternatives. This closure, which includes monitoring, would likely reduce or eliminate the conflict.

The proposed Salt Caves hydroelectric project could be constructed under Alternatives A and B and some activity, such as blasting during construction could potentially cause serious disturbance or cause the maternity site to be abandoned. The Federal Energy Regulatory Commission Environmental Impact Statement (1990) lists several mitigative measures that would likely reduce or eliminate the effects of blasting. These measures include prohibiting blasting within ½ mile of the maternity site from May 1 through August 31, and developing a site-specific management and monitoring plan incorporating information currently being researched about seasonal and year-round use of this site by the maternity colony. Long-term effects of the project can be found in the Federal Energy Regulatory Commission Environmental Impact Statement and short-term effects are summarized in Appendix N.

**Table 4-28. Estimated Effects<sup>1</sup> of Allocations by Alternative on Townsend's Big-eared Bat.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	low	-	low	-	low	-	low
Riparian Mgmt. Area/ Riparian Reserves	+	low	+	low	+	low	+	low	+	low	+	low	+	mod
Mineral Exploration and Development	-	low	-	low	-	low	-	low	-	low	-	low	-	low
Special Habitat Feature Buffers	-	high	-	high	0	none	0	none	0	none	+	low	+	low
Harvest Acres	-	mod	-	low	-	low	+	low	-	low	+	high	+	low
Recreation Development	0	none	0	none	-	low	-	low	-	low	-	low	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).



## Chapter 4 - Environmental Consequences

There is a significant effort by state and federal agencies throughout the region to research Townsend's big-eared bats and their specific habitat requirements, as well as ways to eliminate or reduce human disturbances. If this research and trend of protection continues, cumulative effects in the long term would likely benefit this species. Short term effects would likely continue the trend of declining populations in the region.

### Shortnose Sucker, Lost River Sucker, Klamath Largescale Sucker, and Western Pond Turtle

The abundance of these species and condition of their habitat depends on many factors with the primary components being water quality and streamside riparian condition (see the Effects on Fish and Effects on Water Resources sections for related discussion).

Resource allocations and management activities that could affect these species include: grazing management could influence streamside riparian vegetation and water quality; riparian buffers (Riparian Reserves in the Proposed Resource Management Plan) would protect streamside riparian habitat; water rights could allow for minimum instream flow to protect fish; acres available for timber harvest, off-highway vehicle

management, and road management could affect water quality. See Table 4-29 for a comparison of these allocations by alternative.

Except for riparian buffers (Riparian Reserves in the Proposed Resource Management Plan), water rights, and water quality, most allocations would have a negative effect on these species in Alternatives No Action, A, and B. Most allocations would have a positive effect in Alternatives C, D, E, and the Proposed Resource Management Plan. In the short term, most of these species would continue to decline until water quality conditions and streamside riparian vegetation began to recover and contribute stability to these populations.

The proposed Salt Caves hydroelectric project could be constructed under Alternatives A and B and could potentially affect these species in the upper Klamath River. The Federal Energy Regulatory Commission Environmental Impact Statement (1990) lists all proposed measures that would protect these species during construction and operation of the project. Long-term effects of the project on the shortnose and Lost River suckers would remain unchanged in the short term from construction and operation of the project; however, in the long term, habitat and populations would be minimally affected. Detailed analysis of the effects on these species by this project can be found in the Federal Energy Regulatory Commission Environmental Impact Statement and short-term effects are summarized in Appendix N.

**Table 4-29. Estimated Effects<sup>1</sup> of Allocations by Alternative on the Shortnose, Lost River, and Klamath Largescale Sucker; and Western Pond Turtle.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	mod	-	low	-	low	+	low	-	low	+	high	+	low
Grazing Management and Livestock Enclosures	-	low	-	mod	-	mod	+	low	+	mod	+	high	+	low
Riparian Mgmt. Area/ Riparian Reserve	+	low	+	low	+	low	+	mod	+	high	+	high	+	high
Water Quality	0	none	0	none	+	low	+	mod	+	high	+	high	+	mod
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	low	+	low	+	low	-	low
Road Management	-	low	-	low	-	low	-	low	-	low	+	high	-	low

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).

## Other Special Status Animals

In general, other special status species (federal candidate, state-sensitive, bureau assessment) (see Table 4-30) would be less impacted by BLM actions under Alternatives C, D, E and the Proposed Resource Management Plan than under Alternatives No Action, A, and B. This is primarily due to less timber harvest and fewer other intensive activities under the former alternatives. However, under all alternatives, special status species that occur in areas managed primarily for timber production could be adversely affected by timber harvest and associated practices. In these areas, BLM would determine whether a proposed action would contribute to the listing of affected species prior to the action. If an action was determined to contribute to listing, the action would be modified or dropped.

A number of species (for example, some migratory) are not expected to be affected under any of the alternatives primarily because of their limited habitat and/or distribution on BLM-administered lands. These species are listed at the end of Table 4-30. Not enough information was available to assess the effects of the alternatives on invertebrates (such as, caddisflies, butterflies, and beetles).

## Supplemental Environmental Impact Statement Special Attention Animal Species

The analysis of impacts of the proposed resource management plan also incorporates by reference the conclusions of the Supplemental Environmental Impact Statement Appendix J2 regarding: arthropods, mollusks, amphibians and reptiles, birds, mammals other than bats, bats, and early successional species. In summary, the Supplemental Environmental Impact Statement concluded that its Alternative 9 (which is essentially incorporated in the Proposed Resource Management Plan) would have the following consequences:

**Fish** - Alternative 9 would result in a strong likelihood of providing sufficient aquatic habitat to support stable, well-distributed populations of resident redband, rainbow, and cutthroat trout.

**Arthropods** - Alternative 9 would provide fairly high habitat protection to the various functional groups assessed in the Supplemental Environmental Impact Statement compared to the other alternatives. Standards and guidelines were incorporated into

Alternative 9 which might increase the likelihood that the necessary habitat components would be maintained.

**Mollusks** - Alternative 9 also provides fairly high habitat protection to mollusks. For example, Riparian Reserves are important to the maintenance of habitat for freshwater snails and clams, and Alternative 9 rated well for these species. In addition, standards and guidelines were incorporated into Alternative 9 to benefit the habitat components required by many of these species. Nonfederal lands are an important consideration for the persistence of some mollusks, and substantial risks of extirpation will remain even with significant conservation measures in place on federal lands. Species with especially high risk are associated with large rivers.

**Amphibians** - Alternative 9 ranks well in providing the necessary habitat components for amphibians. Standards and guidelines were incorporated into Alternative 9 which might benefit all amphibians assessed in the Supplemental Environmental Impact Statement. For example, for the tailed frog, Alternative 9 is expected to provide habitat protection from Riparian Reserve Scenario 1. Retention of coarse woody debris in the matrix and survey and manage standards and guidelines is expected to provide habitat protection.

**Birds** - Alternative 9 is favorable to birds because it provides a set of allocations and management practices that produce the necessary habitat components for birds. Standards and guidelines incorporated into Alternative 9 will benefit the black-backed woodpecker. All of the birds considered in the Supplemental Environmental Impact Statement occur on both federal and nonfederal lands. Some are neotropical migrants and migrate to Mexico or central America for the winter season. For all of these migratory species, habitat on the winter range is likely as important as breeding habitat in maintaining viable populations. No other standards and guidelines on federal land can provide habitat to mitigate the potential cumulative effects on these species from loss of habitat on nonfederal lands.

**Mammals Other Than Bats** - Alternative 9 provides the necessary habitat components for those species assessed in the Supplemental Environmental Impact Statement. Standards and guidelines were incorporated in Alternative 9 which will benefit all these species, including implementation of Riparian Reserve Scenario 1 and retention of coarse woody debris on matrix lands. Other standards and guidelines include provision of spotted owl activity centers in the matrix and the survey and manage guideline for the red tree vole. None of the species that occur within the planning area are highly restricted to nonfederal lands.

Table 4-30. Effects on other Special Status Animal Species During the Short Term (10 Years) and Long Term (100 Years) Under the Various Alternatives.<sup>1</sup>

Species	Potential Impacts to Other Special Status Over Next 10/100 Years						
	NA	A	B	C	D	E	PRMP
<b>Federal Candidate</b>							
<b>Amphibians</b>							
Spotted Frog	-/-	-/-	-/-	+/+	+/+	+/+	+/+
Cascade Frog	-/-	-/-	-/-	+/+	+/+	+/+	+/+
<b>Birds</b>							
Mountain quail	0/0	0/0	0/0	0/+	0/+	0/+	0/+
<b>Mammals</b>							
Pacific Fisher	-/-	-/-	-/-	-/0	-/+	+/+	+/+
<b>Bureau Assessment</b>							
<b>Amphibians and reptiles</b>							
Western Toad	-/-	-/-	-/-	0/+	0/+	0/+	0/+
California Mountain King snake	0/0	0/0	0/0	+/+	+/+	+/+	+/+
Sharptail Snake	0/0	0/0	0/0	+/+	+/+	+/+	+/+
<b>Birds</b>							
White-headed Woodpecker	-/-	-/-	-/-	-/+	-/+	-/+	-/+
Acorn Woodpecker	-/-	-/-	-/-	-/+	-/+	-/+	-/+
Black-backed Woodpecker	-/-	-/-	-/-	-/+	-/+	-/+	-/+
Lewis Woodpecker	-/-	-/-	-/-	-/+	-/+	-/+	-/+
Williamson's Sapsucker	-/-	-/-	-/-	-/+	-/+	-/+	-/+
Great Gray Owl	-/-	-/-	-/-	0/+	0/+	0/+	0/+
Northern Pygmy Owl	-/-	-/-	-/-	0/+	0/+	0/+	0/+
Flammulated Owl	-/-	-/-	-/-	0/+	0/+	0/+	0/+
Bank Swallow	-/-	-/-	-/-	0/+	0/+	0/+	0/+
Pygmy Nuthatch	-/-	-/-	-/-	-/+	-/+	-/+	-/+
<b>Mammals</b>							
Marten	-/-	-/-	-/-	-/0	-/+	0/0	-/+

Abbreviations Used: NA = No Action PRMP = Proposed Resource Management Plan

Ratings: 0 = no known effect - = negative effect + = positive effect

<sup>1</sup> Ratings are based on expected habitat/population impacts for the entire planning area. For any alternative, however, a positive impact could occur to a subpopulation or habitat area, even though a negative impact is expected for the entire population of a species. The reverse situation could also be true.

Special Status/Supplemental Environmental Impact Statement Special Attention Species for which no effects are anticipated under any of the alternatives:

Federal Candidate - Black Tern, Western Snowy Plover, Ferruginous Hawk, White-faced Ibis, Slender Sculpin, Pacific Fisher, North American Lynx, and California Wolverine.

Bureau Assessment - Tailed Frog, Purple Martin, Great Egret, Snowy Egret, Loggerhead Shrike, Swainson's Hawk, Yellow Rail, Fringed Myotis, Pacific Palid Bat, Ringtail

**Bats** - Alternative 9 will maintain and enhance the habitat components needed by bats in the resource area. Two standards and guidelines including protection of caves and abandoned mines and other structures and retention of clumped green trees and snags in the matrix would contribute to the protection of these species.

**Early Successional Species** - Alternative 9 would provide for a relatively low amount of acres of this successional stage on BLM-administered lands. The BLM-administered lands in the district occur within a broader landscape of nonfederal lands where substantial early-seral forests will be created through logging and other management activities. These lands may contribute to the maintenance of early-successional forest habitat over time.

## Effects on Fish

Management of vegetation in a drainage basin primarily determines the quality of the fish habitat. Vegetation controls the movement of water through the basin, maintains water quality, stabilizes upslope and channel areas, and provides structural material for the stream channel. Timber management activities, which change the forest successional age, have both a short and long-term impact on the aquatic system.

Initial harvesting of timber in a basin usually has little or no impacts on fish production potential in the basin. As a greater percentage of the basin is harvested within a relatively short period of time, fish habitat may decline, sometimes quite rapidly, with impacts cumulative and extending downstream due to changes in hydrology, reduced water quality, and loss of large woody material. Retention of riparian communities and the use of best management practices for constructing roads and landings and protecting potentially unstable areas, may mitigate most potential habitat losses.

Large woody debris provided by the riparian area appears to be the most important single component controlling fish habitat conditions and salmonid populations (Bisson et al. 1987; Brown 1985). Partial or total removal of large woody debris sources usually creates a reduction of pool and off-channel habitat and fish populations (Andrus et al. 1988; Bilby and Ward 1989; Crispin et al. in press; Heifetz et al. 1986; House and Crispin 1990; House et al. 1989; House and Boehne 1987; House and Suther 1991). The input of large woody debris is a major link between terrestrial and aquatic ecosystems (Lienkaemper and Swanson 1987). A basic assumption in evaluating the quality of riparian vegetation is that mature

riparian zones dominated by large conifers maintain or enhance stream channel conditions. Downed large trees provide instream habitat for fish by creating pools and backwater areas. They also improve water quality by trapping sediments and slowing high flows.

Sedell et al. (1988) showed that the number of downed trees and pieces of large woody debris varied with stand age of riparian-wetland areas. Streams flowing through young-growth forests and recently harvested areas contained from one-fifth to one-twentieth the number of large woody debris pieces found in streams in mature forests. The width of a riparian protection area determines the potential amount of large woody debris in a channel. A 94-foot width is capable of providing most of the necessary large woody debris (Murphy and Koski 1989). A 164-foot width is capable of providing an optimum amount of large woody debris (Van Sickle and Gregory 1990).

In the Klamath Falls Resource Area, many riparian areas (especially on the east side) do not contain large conifers through natural conditions. Some riparian areas contain deciduous trees or conifers which never reach 21 inches diameter at breast height. Still other streams flow through meadows or rocky areas where instream habitat is provided by rocks or large woody debris washed down from other areas.

Fish habitat conditions in the Klamath Falls Resource Area are currently improving from a history of degradation. This improvement is expected to continue in the short term for all alternatives, but the rate of improvement will depend on the width or riparian buffers or reserves, and activities outside the riparian-wetland areas. Recovery of east-side streams is slow due to the low annual rainfall. This will not change under any alternatives. The riparian conditions have been stressed over the last several years by the continuing drought. Recovery will depend on the amount and timing of precipitation. Full recovery depends on the maturation of vegetation.

For the streams included in a particular alternative, riparian management areas or Riparian Reserves would result in a gradual change from shrubs, hardwoods and young conifers to large conifers. These large trees would provide most of the large woody debris required for achieving optimum stream conditions.

Under all alternatives, stream improvement and riparian conversion projects are proposed that would speed the recovery of the productive potential in the improved streams. Monitoring of existing habitat improvements show they can provide optimum habitat equivalent to unaltered streams. The projects



## Chapter 4 - Environmental Consequences

would be undertaken only to mitigate existing problems in the short term, and would not be a substitute for restoring and maintaining stream channels and riparian areas. Natural habitat has a much greater longevity than projects that last an average of ten years.

The Proposed Resource Management Plan, which incorporates the Aquatic Conservation Strategy Impact Statement Record of Decision, provides the greatest protection of fish habitat. Compared to most other alternatives, the Proposed Resource Management Plan provides wider Riparian Reserves and more protective measures for perennial and intermittent streams. Although watershed analysis can result in reduced Riparian Reserve widths for intermittent streams (dependent on an analysis of existing conditions in watersheds), this would only take place if warranted based on best information in the analysis process. By including greater protection of intermittent streams, the Proposed Resource Management Plan will thus provide for greater overall watershed protection of upslope, riparian, and downstream areas than in other alternatives (see Table 4-31). This will help stabilize hydrologic function, water quality, and in time large woody debris recruitment within the drainage. This is important because the cumulative effects of management actions on fish habitat over entire watersheds may be more critical than effects on any single component of fish habitat. Because of the uncertainty of funding for watershed restoration and the activities on non-public lands, it is

not possible to estimate how much the production potential will increase through watershed restoration.

Based on a comparison with the Supplemental Environmental Impact Statement analysis, Alternatives No Action, A, B, and C would not reverse the current trend of overall improvement of fish habitat, but would have less likelihood of providing sufficient aquatic habitat to support stable, well distributed populations of various species of fish. Alternatives D and E would provide less fish habitat protection than the Proposed Resource Management Plan but greater protection than Alternatives No Action, A, B, and C.

While the actual production of fish from streams on public lands is strongly impacted by actions outside the planning area, the productive capability is directly correlated with quality of habitat. As habitat improves, the productive potential of the habitat for fish also improves. Recovery depends on regrowth of conifers in and adjacent to the riparian area to mature age classes so that large conifer trees are available to fall into the stream and create fish habitat. Because of the length of time needed for riparian vegetation recovery, natural recovery, which relies on creation of large conifer trees to produce large woody debris, will produce little change in the first decade. The potential productivity is similar for all alternatives in the short term, and is constant for Alternative A in the long term. Productivity potential in third order and larger streams will increase for Alternatives No Action, B, C, D, E, and the Proposed Resource

**Table 4-31. Estimated Effects<sup>1</sup> of Allocations by Alternative on Trout.**

Allocation <sup>2</sup>	NA		A		B		C		D		E		PRMP	
	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree	Type	Degree
Harvest Acres	-	mod	-	low	-	low	+	low	-	low	+	high	+	low
Road Management	-	low	-	low	-	low	-	low	-	low	+	high	-	low
Grazing Management and Livestock Exlosures	-	low	-	mod	-	mod	+	low	+	mod	+	high	+	low
Off-Highway Vehicle Management <sup>3</sup>	-	mod	-	mod	-	mod	-	low	+	low	+	low	-	low
Riparian Mgmt. Area/ Riparian Reserve	+	low	+	low	+	low	+	mod	+	high	+	high	+	high
Water Quality Standards	0	none	0	none	+	low	+	mod	+	high	+	high	+	mod

<sup>1</sup> Type of Effect is positive (+), negative (-), or no effect (0). Degree of Effect is relative and equal to low, moderate, or high.

<sup>2</sup> See text for discussion of how each allocation has an effect on this animal. Also see Table 2-1 where allocations are quantified.

<sup>3</sup> Includes acres and miles of roads/area open and/or closed to off-highway vehicle use (see Table 2-1).



Management Plan. The Proposed Resource Management Plan analysis of effects incorporates by reference the conclusions of the Supplemental Environmental Impact Statement. Specifically incorporated are conclusions about Alternative 9 of the Supplemental Environmental Impact Statement. Refer to the Special Status and Supplemental Environmental Impact Statement Special Attention Species section of this chapter.

Cumulative effects in regard to management of riparian habitat on private lands depend in part on guidelines of the Oregon Forest Practices Act. This act requires less retention of riparian vegetation and downed logs than is proposed under most alternatives on BLM-administered lands. Large trees and large woody debris have been extensively removed from private lands and may not be replaced in the future. Therefore, a major cumulative effect of timber management in individual watersheds, especially those with large private holdings, may be an overall shortage of large woody debris and habitat for priority fish species over the long term.

Anticipated leasable mineral activities are not expected to impact aquatic habitat. If mining development occurred, as described in Appendix N, it could damage riparian-wetland areas and aquatic habitat through increased siltation, degraded water quality, disturbance of spawning gravels, a decrease in substrate stability, increased scouring, and filling of pools. Protection under the Proposed Resource Management Plan and Aquatic Conservation Strategy would eliminate or greatly reduce the potential damage.

Under all alternatives except A and B, land tenure adjustments described in Chapter 2 will permit increased control over important riparian and aquatic habitat, and increase the ability of the resource area to develop and implement aquatic habitat rehabilitation projects for anadromous and resident fish species.

## Effects on Special Areas

Protection of potential special areas varies with each alternative depending on land use allocations, management proposals, and the objectives of the alternatives. Table 4-32 depicts probable changes in the condition of potential special areas in the short term as compared to the present resource conditions.

**Alternative No Action.** Under the Alternative No Action, eleven potential special areas would not be designated as areas of critical environmental concern or receive special management attention. The areas

would be subject to varying degrees of protection and/or commodity development depending upon current resource conditions or present land use allocations. Some protection from timber harvest activities would be provided by conditions, such as non-forest or fragile site (for example, parts of Tunnel Creek or Surveyor forest) classification, and/or by allocations, such as riparian management or visual resource management Class II areas (for example, parts of the upper Klamath River or Miller Creek). Habitats of federally listed and proposed threatened or endangered plant and animal species would also provide some protection to special areas, such as the upper Klamath River and Yainax Butte. Cultural resource values would continue to be protected. Some protection from livestock grazing would continue through natural isolation of areas, such as Yainax Butte, The Bumpheads, and Old Baldy proposed research natural area. The upper Klamath River would continue to receive interim protective management under the National Wild and Scenic Rivers Act, pending Congressional resolution of the designation issue (see Chapter 2, Management Direction Common to Alternatives A through E and the Proposed Resource Management Plan, Wild and Scenic Rivers section), and protection under Oregon's State Scenic Waterways Act.

Commodity values outside these protective allocations in Alternative No Action would be available for development. In the short term approximately 2,200 acres of timber would be available for timber harvest, 9,600 acres would be available annually for livestock grazing, therefore some values in the potential special areas could be lost or damaged. The Old Baldy potential research natural area cell as listed in the Oregon Natural Heritage Plan (Natural Heritage Advisory Council and The Nature Conservancy 1988) would not be filled using BLM-administered land. This research natural area cell (high-elevation brushfield) is not included in any existing or proposed U.S. Forest Service research natural areas. The failure to maintain this area in an undisturbed condition would diminish, if not destroy, its values for research and for monitoring changes in unmanaged baseline areas as compared to managed areas. By failing to gain knowledge of ecosystem functions, the quality of future management on lands allocated for commodity use may be diminished.

**Alternative A.** Under Alternative A, all eleven potential special areas would be available for resource development activities, such as road construction, timber harvest, energy and mineral exploration and development (including hydroelectric and alternative energy projects). These activities could cause the loss of or damage to some or all of the values for which the

Table 4-32. Probable Changes in the Condition of Potential Special Areas<sup>1</sup>.

Potential Special Areas	NA	A	B	C	D	E	PRMP
Miller Creek Potential ACEC	-	-	+	+	+	+	+
Pacific Crest Trail Potential ACEC	-	-	-	+	+	+	0
Upper Klamath River Potential ACEC	-	-	-	+	+	+	+
Yainax Butte Potential ACEC	-	-	+	+	+	+	+
Alkali Lake	0	-	-	+	+	+	+
Spencer Creek Potential ACEC	-	-	-	+	+	+	+
Tunnel Creek Wetlands Potential ACEC	-	-	-	+	+	+	+
The Bumpheads Potential ACEC	0	0	0	+	+	+	+
Clover Creek Forest Educational Area	-	-	-	+	+	+	+
Surveyor Forest Potential ACEC	-	-	-	+	+	+	+
Old Baldy Proposed Research Natural Area	-	-	-	+	+	+	+

<sup>1</sup> Summary of effects to special areas by alternative are presented in Table 4-33.

Abbreviations Used: ACEC = Area of Critical Environmental Concern

0 = None or negligible

- = Adverse

+ = Beneficial

areas are proposed for designation. A summary of the effects on the upper Klamath River area from construction and operation of the proposed Salt Caves hydroelectric project is in Appendix N. In the short term, approximately 3,700 acres of timber would be available for timber harvest, 9,600 acres would be available annually for livestock grazing, and 9,600 acres would be available for mineral leasing in potential special areas. The special values could be lost or damaged by such surface- and vegetation-disturbing activities. The Old Baldy potential research natural area cell would not be filled using BLM-administered land. This research natural area cell (high elevation brushfield) is not included in any existing or proposed U.S. Forest Service research natural area (see Alternative No Action for consequences of not maintaining research natural area cells).

**Alternative B.** Under Alternative B, eight of the eleven potential special areas would be available for varying degrees of resource development depending upon present land use allocations (Miller Creek, upper Klamath River, and Yainax Butte areas would be designated as areas of critical environmental concerns). Construction of a hydroelectric project could occur on the upper Klamath River, resulting in

the loss or damage of one or more special values (see Appendix N for a summary of effects from the proposed project). In the short term approximately 1,500 acres of timber would be available for timber harvest, 7,100 acres would be available annually for livestock grazing, and 1,900 acres would be available for mineral leasing without restriction. Some special values could be lost or damaged. The Old Baldy potential research natural area cell would not be filled using BLM-administered land. This research natural area cell is not included in any existing or proposed U.S. Forest Service research natural area (see Alternative No Action for consequences of not maintaining research natural area cells).

**Alternatives C, D, and E.** Under Alternatives C, D, and E, no potential special areas would be adversely affected by resource development activities. Alternatives D and E provide some additional restrictions to resource development activities.

**Proposed Resource Management Plan.** Under the Proposed Resource Management Plan, the Miller Creek, upper Klamath River, and Yainax Butte areas would be designated as areas of critical environmental concerns. The Old Baldy area would be designated an

area of critical environmental concern/research natural area as it would protect a high quality example of the target natural area cell need (high elevation brushfield and associated plant communities). See Chapter 2 Special Areas, for restrictions to developments in the special areas.

The harvest of existing forest stands in the Pacific Crest Trail area under the Proposed Resource Management Plan would be an irreversible or irretrievable commitment of resources. While the Proposed Resource Management Plan provides for a 50 foot no cut buffer, Alternatives C, D, and E would designate the area as an area of critical environmental concern and provide a ¼-mile no cut buffer. The opportunity to protect the special scenic values in this area would be reduced with a 50 foot buffer. The ¼ mile Visual Resource Management Class II buffer on either side of the trail would retain the existing character of the landscape. This management is consistent with the overall management plan for the Pacific Crest Trail completed by the U.S. Forest Service in January, 1982. The portion of the Pacific Crest Trail, within the Old Baldy area of critical environmental concern/research natural area would be protected from timber harvest and the visual resources would be preserved.

**Summary.** Although protected from planned timber harvest, those areas designated for area of critical environmental concern or special management attention under the selected alternative could be adversely affected by salvage timber harvests. Special areas with natural process or system values that could be affected include: Miller Creek, Yainax Butte, Tunnel Creek, Surveyor Forest Area and the upper Klamath River. Salvage harvests in the existing forest stands in these areas could be an irreversible or irretrievable commitment of resources. The Old Baldy area of critical environmental concern/research natural area would not be available for scheduled or salvage timber harvest, or firewood sales.

A summary of the effects on potential special areas is displayed in Table 4-33.

## Effects on Cultural Resources, Including American Indian Values

The Klamath Falls Resource Area contains cultural sites used by Native and non-Native Americans in both historic and prehistoric times. Known cultural

sites are unevenly distributed throughout the planning area. There is a high probability that many unknown sites exist, as less than 10 percent of the planning area has undergone class III intensive field inventory to identify cultural sites (see Appendix 3-F for a discussion of the cultural resource survey classification system). Cultural resources are classified within three broad categories: Traditional Use, Prehistoric Archaeological Sites, and Historic Sites. Of these, traditional use is the most difficult to define because there may be no tangible artifact evidence on the earth surface.

The potential for affecting cultural sites varies with the amount and location of surface-disturbing activity permitted under each alternative. Alternatives that allow the most surface disturbance or allow activities in known or high probability cultural areas have the greatest potential negative effects. Ground-disturbing actions such as timber harvest; reforestation; and construction of recreation sites, roads, trails, and hydroelectric facilities have the greatest potential for negatively affecting cultural resources, including traditional use areas. Natural processes, such as wildfire, flooding and erosion, and earthquakes may also affect cultural resources negatively.

Cultural resource surveys and mitigative measures for all surface-disturbing activities would occur similarly under all alternatives. Cultural sites could potentially remain undetected during surveys (subsurface sites and sites under a high concentration of duff are seldom detected); thus, regardless of survey results, all surface-disturbing activities could affect cultural values. These activities could also positively affect knowledge of cultural resources, as these actions necessitate research and surveys to gather cultural resources data. However, some information could be lost or destroyed even with well-structured research and recovery operations. When a site is excavated, it is an irreversible and irretrievable commitment of resources.

Activities, such as rafting and camping, that increase the use of areas with high concentrations of cultural sites have a moderate probability of negatively affecting cultural resources through illegal collection of artifacts and intentional or unintentional disturbance of sites. Actions with a low to moderate potential for negatively affecting cultural resources include fire suppression, prescribed burning, range-land improvement projects, livestock grazing, and dispersed recreational activities.

Cultural resources are positively affected by actions that preclude or decrease the potential for on-site surface disturbance, such as buffers and/or exclusions of riparian-wetland areas, special habitats, and areas containing special status or Supplemental

Table 4-33. Summary of Effects to Special Areas by Alternative.

Potential Special Area	Alternative	Effects
Miller Creek	NA, A	Potential adverse effects on botanical/natural systems, scenic and wildlife values primarily from timber harvest, livestock grazing, road construction. Potential positive effects from prescribed fire.
	B, C, D, E, PRMP	Area designated ACEC: Positive effect from protection of wildlife habitat, scenic qualities, and botanical/natural systems. Potential adverse effects to botanical/natural systems or processes from salvage timber harvests. Potential positive effects from prescribed fire, OHV closures, restricted grazing, and VRM Class II management under Alternatives C, D, E, and PRMP.
Yainax Butte	NA, A	Potential adverse effects primarily from timber harvest and road construction. Potential positive effects from prescribed fire.
	B, C, D, E, PRMP	Area designated ACEC. Positive effects from protection of natural systems and plant communities. Potential positive effects from prescribed fire. Potential adverse effects to botanical/natural systems or processes from salvage timber harvests. OHV limitations under alternatives C, D, E, and PRMP.
The Bumpheads	NA, A, B	Some potential for adverse effects to scenic and botanical values from livestock grazing.
	C, D, E, PRMP	Area protected as a Special Botanical/Habitat Area for the PRMP. Positive effects from protection of botanical/natural systems and scenic resources. Potential positive effects from OHV restrictions and livestock fencing. Area designated ACEC under Alternatives D and E only.
Alkali Lake	NA, A, B	Adverse effects primarily from livestock grazing and limited ability to provide riparian management area protection to riparian/wetland habitat.
	C, D, E, PRMP	Area protected as a Special Botanical/Habitat Area for the PRMP. Potential positive effects on riparian/wetland habitat from season of use restrictions on livestock grazing under Alternatives C, D, and PRMP (no grazing in Alternative E), livestock fencing, and land exchanges.
Spencer Creek	NA, A, B	Potential adverse effects on fisheries values primarily from timber harvest and livestock grazing.
	C, PRMP	Positive effect on fisheries value from restricted timber harvest and grazing under Alternatives C and PRMP. Positive effects from OHV closure and ¼ mile either side VRM Class II management under Alternatives C and the PRMP.
	D, E	No planned timber harvest and restricted grazing under Alternatives D and E. Area designated ACEC under Alternatives D and E only. Positive effects from OHV closure and VRM class II management under Alternatives D and E.
Tunnel Creek Wetlands	NA, A, B	Adverse effects on botanical/natural system values primarily from livestock grazing and timber harvest.
	C	Positive effect on botanical/natural systems values from restricted grazing and timber harvest, 150 foot buffer on wet meadow. Potential adverse effects on botanical/natural systems or processes from salvage timber harvests.
	D, E	Area designated as ACEC. Additional positive effects on botanical/natural systems values from livestock fencing and no planned timber harvest. Potential adverse effects on botanical/natural systems or processes from salvage timber harvests.
	PRMP	Area protected as a Special Botanical/Habitat Area for the PRMP. Positive effects on botanical/natural systems values from restricted timber harvest, livestock fencing. Potential adverse effects on botanical/natural systems or processes from salvage timber harvests. Positive effects from OHV limitations.



**Table 4-33. Summary of Effects to Special Areas by Alternative (continued).**

Potential Special Areas	Alternative	Effects
Clover Creek Forest Educational Area	NA, A, B	Potential negative effects on educational site values primarily from unrestricted timber harvest.
	C,D,E,PRMP	Area protected as an Environmental Education area for the PRMP. Positive effects from restricted timber harvest to meet educational objectives for the area.
Pacific Crest Trail	NA, A, B	Potential adverse effects on intrinsic scenic value from the trail primarily from timber harvest and brushfield conversion.
	C, D, E	Area designated ACEC. Potential positive effects on the intrinsic scenic value as area is not available for planned timber harvest.
	PRMP	Potential for negative effects on the intrinsic scenic value from the trail primarily from timber harvest and brushfield conversion outside of 50 foot buffer either side of trail. Area not designated ACEC. VRM Class II buffer on either side of trail. PRMP management consistent with Pacific Crest Trail Comprehensive plan completed January 1992. Visual resources preserved where Pacific Crest Trail crosses Old Baldy ACEC/RNA.
Old Baldy	NA, A, B	Adverse effects primarily from timber harvest and road construction causing a failure to represent one RNA cell in the Oregon Natural Heritage Plan. Botanical/natural system values would be disturbed and degraded.
	C, D, E,	Area designated ACEC/RNA if area meets RNA cell need. Positive effects from no planned timber harvest; natural processes or systems and botanical values would be protected. Potential adverse effects on botanical/natural systems or processes from salvage timber harvests.
	PRMP	Area designated ACEC/RNA as it meets RNA cell need. Positive effects from no timber or salvage harvest or firewood cutting. Area closed to OHV use and mineral use. Area to be kept free of cattle use. Natural processes or values would be protected. Positive benefits from prescribed fire.
Surveyor Forest Area	NA, A, B	Adverse effects on botanical/natural system, scenic and wildlife values primarily from timber harvest, road construction, and livestock grazing.
	C, D, E, PRMP	Area protected as an environmental education area. Positive effects on botanical/natural system, scenic and wildlife values from no planned timber harvest and livestock fencing. Area designated ACEC under Alternatives D and E. Potential adverse effects on botanical/natural systems or processes from salvage timber harvests. Positive benefits from prescribed fire and OHV limitations.
Upper Klamath River	NA, A	High potential for adverse effects on the relevant resource values (historic/cultural, scenic, fish, wildlife, natural process/system, and natural hazards) from timber harvest and livestock grazing; and hydroelectric development in Alternative A. Potential positive effects from prescribed fire.
	B	Area designated ACEC, however high potential for adverse effects on the relevant resource values if hydroelectric development occurs. No planned timber harvest, restricted grazing. Potential positive effects from prescribed fire. Potential adverse effects on botanical/natural systems or processes from salvage timber harvests.
	C, D, E, PRMP	Area designated ACEC. Positive effects on the relevant resource values from no planned timber harvest, restricted grazing (no grazing for Alternative E), OHV limitations, and from prescribed fire. Potential adverse effects on botanical/natural systems or processes from salvage timber harvests.

Abbreviations used in this table: ACEC = area of critical environmental concern PRMP = Proposed Resource Management Plan  
VRM = Visual resource management OHV = off-highway vehicle RNA = Research Natural Area



## *Chapter 4 - Environmental Consequences*

Environmental Impact Statement special attention species; and designations of special areas, wild and scenic rivers, and national archaeological/historical districts. Positive effects could also result from educational programs that increase public awareness of cultural resources and indirectly prevents site disturbance; grazing systems that exclude cattle from cultural sites; off-highway vehicle designations that restrict use to specific areas; visual resource management and rural interface allocations that limit physical disturbance; and acquisitions of lands with cultural values.

Unidentified sites, especially traditional use areas, have the highest probability of being found in areas such as riparian areas, adjacent to springs and wetlands, in high rocky, well drained soils, and along rock outcroppings, especially those with visual resources such as views of Mounts Shasta and McLoughlin or other areas conducive to meditation. Where traditional use areas are not identified to the BLM by interested tribes, surface-disturbing activities could have a negative effect on the traditional uses of the area. Conversely, where such traditional use areas are known by the BLM the values or resources that make it a traditional use area could be maintained or enhanced by management activities. For example, where Epos (also called Yampa, a basic food plant) is collected, management prescriptions could help maintain or enhance conditions for that species. This would be a positive benefit to the traditional use values. Analysis of such actions is part of the site-specific planning and tribal coordination process, where affected tribes have the opportunity to indicate their interests.

**Alternative No Action.** The Alternative No Action would provide interim protection to the outstandingly remarkable cultural values in the Klamath River Canyon, pending congressional action on wild and scenic river legislation. Existing riparian buffers and improvements also positively affect cultural values by providing protection to these high potential areas. The high level of timber production has a negative effect because of possible destruction of cultural sites that are not discovered during the survey process. Archaeological/historical district designations would provide a positive effect to cultural resources by providing an additional measure of protection.

**Alternative A.** Alternative A has higher net negative effects than Alternative No Action because of the potential affect on cultural resource values from granting a right-of-way for the proposed Salt Caves hydroelectric project. Effects from this project would be mitigated following federal standards, however,

values would be lost during construction. The Klamath Canyon is a traditional use area for members of the Klamath Tribe and the Shasta Nation. Construction of the Salt Caves project would have a negative effect on their use of this area (Federal Energy Regulatory Commission 1990).

Negative effects from potential disturbance of cultural sites due to increased livestock grazing and reduced riparian buffers are greater in Alternative A than No Action. Alternative A has reduced levels of surface disturbance from reduced timber harvest and forest lands excluded from timber harvest over the Alternative No Action. These reductions would provide minor positive benefits by eliminating potential conflict with cultural sites. Buffers on meadows, wetlands, and swamps also provide moderate positive benefits.

Alternative A includes the most amount of land open to off-highway vehicle use. This would have a moderate negative effect to cultural sites due to destruction of these sites by vehicles or increased access of these sites to the public. Alternative A also has the greatest potential effect on cultural sites through mineral exploration and development.

**Alternative B.** Potential negative effects from Alternative B are slightly less than Alternative A, primarily from reduced timber harvests, reduced grazing, reduced land open to off-highway vehicle's use, and increased riparian buffers. Effects from construction of the hydroelectric project in the Klamath Canyon would be the same as for Alternative A. Positive effects would occur under alternative B from the designation of the Klamath Canyon, Miller Creek, and Yainax Butte as areas of critical environmental concerns from increased protection of cultural values.

**Alternative C.** Alternative C would have long-term positive effects from designation of the Klamath River under the National Wild and Scenic Rivers Act because outstanding remarkable cultural values in the canyon would be provided long-term protection under this designation. There is less probability of negative effects associated with surface-disturbing activity through reductions in timber harvest, increased buffer size, and reductions in livestock grazing. Increased health of vegetation under this alternative would provide protection of cultural site through vegetative screening. Reduction in lands open to off-highway vehicle use and increases in road closures would also potentially protect cultural sites.

**Alternative D.** Alternative D would provide positive effects through a more restrictive designation (as a scenic river area as opposed to a recreational river

area) of the Klamath River under the National Wild and Scenic Rivers Act which could reduce future developments in the canyon. Increased riparian buffers in this alternative would also reduce the potential effects on cultural sites. Significantly reduced land available for off-highway vehicle use and additional road closures would also have positive benefits by reduction of site disturbance. However, increased timber harvests over Alternative C would increase the probability of inadvertent site destruction.

**Alternative E.** Alternative E would provide the most protection for cultural resources due to the reduction of surface-disturbing activities, especially timber harvest. Reductions in off-highway vehicle use would be greatest under this alternative. Designation of the upper Klamath River, Antelope Creek, and Miller Creek under the National Wild and Scenic Rivers Act would also provide long-term protection of cultural values in these areas.

**Proposed Resource Management Plan.** The Proposed Resource Management Plan is most similar to Alternatives C and D. Long term protection would be offered to cultural resource values and Native American traditional use areas in the Klamath Canyon from designation as a scenic river area under the National Wild and Scenic Rivers Act. Protection of cultural values would be a priority in the three designated areas of critical environmental concern and other special areas. The amount of surface disturbance associated with timber harvest would be greater than in Alternative C. Riparian buffers would provide additional protection of cultural sites in these areas.

## Summary

Potential negative effects to cultural resources decrease from Alternative A to E. The Alternative No Action would provide some protection for cultural resources through riparian buffers, but the high level of resource development could have negative effects on this resource. The Proposed Resource Management Plan provides positive benefits over the Alternative No Action because of increased riparian buffers, decreased surface-disturbing activities, and increased health of the natural systems which improves their ability to provide vegetative screening of cultural sites. Long-term protection of the Klamath River Canyon, an area with a high concentration of cultural values, would be provided under Alternatives C, D, E, and the Proposed Resource Management Plan. Alternative E provides the most protection to cultural resources due to the small acreage available for timber harvest and other surface-disturbing activities.

Some actions, including prescribed burning and surface-disturbing activities associated with reseeding for habitat enhancement, could cause increased negative effect from Alternatives A to C. Certain potentially adverse effects cannot be avoided and could affect cultural resources regardless of which alternative is adopted. Unavoidable potential negative effects include cultural site vandalism; and disturbance from fire suppression, recreational activity, and mineral exploration and development. Irreversible and irretrievable commitment of cultural resources occurs when sites go undetected during surveys and are damaged or destroyed during surface-disturbing activities. Irretrievable commitment of cultural materials also occurs during site excavation because of the loss in value that the materials possess when left in place. Once a site is used for research, it is gone from the pool of sites available for future research.

## Effects on Visual Resources

Clearcutting, road construction, and most other timber management and surface-disturbing practices change vegetative patterns, alter species composition, disrupt the land surface and thereby cause effects on visual resources. The severity of an adverse visual effect depends on many factors, including type of timber harvest or surface-disturbing activity; location, number, size, and shape of cutting units; yarding method; location and design of roads; amount and treatment of logging slash and road construction debris; and visibility of disturbed areas. The pre-timber harvest or pre-disturbance condition (such as scenic quality) of a viewshed is also a determining factor. Generally, viewsheds that are noticeably altered can be further modified with less adverse visual effect than viewsheds with little or no visible alteration. In some situations, visual effects from timber management practices can be beneficial. Examples are the removal of dead or dying trees, thinning foreground vegetation to create pleasing views, and the blending of contrasting cutting boundaries, especially on ridgetops.

Allocation of lands for development of major rights-of-way (powerlines and pipelines) and telecommunication facilities located in highly visible areas have high short- and long-term adverse effects on visual resources. Any application for such right-of-way would require appropriate environmental analysis, and the effects on visual resources would be analyzed at that time.

The proposed Salt Caves hydroelectric project could be constructed under Alternatives A and B and could potentially affect visual resources in the upper Klamath River canyon. Long-term effects of the project on visual resources can be found in the 1990 Federal Energy Regulatory Commission Environmental Impact Statement and short-term effects are summarized in Appendix N.

In all of the alternatives except D, the visual resource management classes and management objectives differ from the *inventory classifications* of areas shown on Map 3-9. The visual resource management classes and objectives of each alternative are designed to fit into the overall resource management emphasis of that alternative (see Appendix U). Revisions of the inventory classes were either downgrades (such as Visual Resource Management Class II to IV) or upgrades (such as Visual Resource Management Class II to I). An alternative that *upgrades* visual resource management inventory classes would provide more restrictive management objectives (for example, less vegetative disturbance) for affected areas. *Downgrading* would have the opposite effect and, consequently, could possibly result in a high level of vegetative disturbance in affected areas. The effect of downgrading might be to lower the scenic quality of those areas. However, the BLM's ability to affect an area's overall scenic quality depends to a large extent on land ownership patterns. In more than 75 percent of the areas inventoried, non-BLM-administered lands and management practices dominate the landscape, which could have a greater effect on overall scenic quality than activities on downgraded BLM-administered lands.

Table 4-34 shows probable changes in visual resource conditions in the short term due to management activities under each alternative. Under all the alternatives, no adverse changes in visual resource conditions are expected on 170,000 acres of BLM-administered land because they would be managed to meet visual resource management inventory standards. These areas are non-forest and unsuitable woodland areas, and Topsy and Surveyor recreation sites. On the remaining 42,000 acres of BLM-administered forest land, changes in visual resources conditions would vary by alternative because of the modification of inventory classes. However, the use of uneven-age (selection) harvest methods in the Klamath Falls Resource Area would, in general, provide protection of visual resources in those timber harvest areas that received a downgrading of inventory classes. See Table 2-1 and Chapter 2, Visual Resources, for descriptions of areas to be managed by visual resource management class.

**Alternative No Action.** Under the Alternative No Action, general visual resource conditions on BLM-administered land would continue in a slight decline due to the extensive areas of west side lands managed as Visual Resource Management Class IV, the large area of non-BLM-administered west side lands, and continuation of the BLM's timber harvest levels and prescriptions established in 1980 and 1985. More land would be managed as Visual Resource Management Class IV under the Alternative No Action than what was inventoried as such.

**Alternative A.** Alternative A would be the most detrimental alternative for visual resources due to Visual Resource Management Class IV management of forest areas previously inventoried as Visual Resource Management Classes II and III. During the life of the plan, approximately 7,900 acres of these downgraded forested areas would be available for planned timber harvest, road construction, or other surface-disturbing activities, such as hydroelectric or other alternative energy projects. A significant effect on visual resources could occur in the short and long term due to widespread vegetative disturbances from these activities.

**Alternative B.** Under Alternative B, Visual Resource Management Class IV management would be applied to forested areas previously inventoried as Visual Resource Management Classes II and III, except those areas within ¼-mile of highly sensitive areas, such as major highways, state scenic waterways, and developed recreation sites. During the life of the plan approximately 7,300 acres of these downgraded areas would be planned for timber harvest, road construction, or available for other surface-disturbing activities, including hydroelectric or other alternative energy projects, and some adverse visual effects could occur.

**Alternative C.** Under Alternative C, Visual Resource Management Class IV management would be applied to some forested areas previously inventoried as Visual Resource Management Classes II and III. However, forested lands managed for old growth restoration and retention would meet Visual Resource Management Class II objectives. Other forested lands managed within the high retention areas or forest stands managed under partial stand retention prescriptions would meet Visual Resource Management Class III. During the life of the plan, approximately 2,900 acres of these downgraded areas would be harvested or available for other surface-disturbing activities, and little or no adverse visual effects are expected to occur.

**Alternative D.** Compared to Alternatives No Action, A, B, and C, Alternative D would benefit visual

Table 4-34. Probable Changes in Visual Resource Conditions in the Short Term.

VRM Class	Existing Condition <sup>1</sup>	Visual Resource Condition Changes <sup>2</sup>						
		NA	A	B	C	D	E	PRMP
I	good	0	0	0	0	0	+	0
II	good	0	-	-	0	+	+	+
III	fair	0	-	-	0	+	+	+
IV	fair	-	-	-	0	0	N/A	+

<sup>1</sup> Condition determined by resource area specialists based on field inventory of scenic quality.

Good = slightly altered viewsheds with scenic value.

Fair = moderately altered viewsheds.

Poor = highly altered viewsheds with low scenic value.

<sup>2</sup> + = beneficial    0 = none or negligible    - = adverse

N/A = Non applicable (there would be no VRM Class IV areas in Alternative E)

Ratings of change (+,-,0) represent the anticipated effect of timber management and other commodity development on existing visual resource conditions, taking into consideration the following: VRM class objectives for affected areas; probable effects of upgrading/downgrading; land ownership patterns and adjacent land uses; and level of timber harvest and other commodity development during the life of the plan. (See Appendix U for background information regarding ratings).

Abbreviations used in this table: VRM = Visual Resource Management; PRMP = Proposed Resource Management Plan; NA = No Action

resources on Visual Resource Management Class II and III forest lands because all lands would be managed to meet visual resource management inventory standards. Scenic quality would be maintained or improved on BLM-administered lands.

**Alternative E.** Alternative E would be the most beneficial alternative for visual resources because it would allow the least amount of vegetative disturbance. Unharvested areas would be maintained at inventory class conditions or better. All BLM-administered lands within ¼ mile of Gerber, Topsy, and Surveyor recreation sites; Highway 66; and the Klamath State Scenic Waterway (segment 2 of the upper Klamath River) would be managed to Visual Resource Management I standards. The condition of areas with moderate to low value scenery and/or low sensitivity would improve in the long term because Visual Resource Management IV areas would be managed to Visual Resource Management III standards.

**The Proposed Resource Management Plan.** The Proposed Resource Management Plan would benefit visual resources in most areas of BLM-administered lands. Areas of high scenic quality, such as lands within ¼ mile of developed recreation sites, the Pacific Crest Trail, Spencer Creek, State Scenic Waterways, and rivers designated scenic under the

National Wild and Scenic River Act would be managed Visual Resource Management Class II. Scenic quality would be maintained within ¼ mile of rural interface areas and Highway 66. There would be an increase in the acres managed as Visual Resource Management Class II and III over the Alternative No Action due to the updated visual resource inventory (used for Alternatives A through E and the Proposed Resource Management Plan) and additional areas of high scenic quality that are protected. There would be no unavoidable adverse visual effects from the Proposed Resource Management Plan.

## Summary

Potential negative effects on visual resources would decrease from Alternative A to E with the Alternative No Action falling between Alternatives B and C. The Proposed Resource Management Plan most closely approximate Alternative D, with slightly more positive effects on developed recreation sites and slightly more negative effects on the Klamath Forest Estates rural interface area.

Certain potential adverse effects cannot be avoided and could affect visual resources under Alternatives No Action, A, B, and C. Unavoidable potential



adverse effects include hydroelectric forebays, canals, and electric generating equipment (under Alternatives A and B only) and intensive timber harvest areas and roads after mitigation (under Alternatives No Action, A, and B). Cumulative negative effects would occur regardless of which alternative is adopted. Cumulative negative effects on visual resources would be expected to continue as non-BLM-administered lands and management practices dominate the planning area landscape.

## Effects on Wild and Scenic Rivers

The following environmental consequences discussion relates solely to the six BLM-administered river segments studied for suitability in the Resource Management Plan (Miller Creek, Barnes Valley Creek, Spencer Creek, segments A and C of Antelope Creek, and segment 2 of the upper Klamath River). This includes the one river segment that was found suitable (segment 2 of the upper Klamath River) and those that have been found not suitable (Miller Creek, Barnes Valley Creek, Spencer Creek, and segments A and C of Antelope Creek).

To be eligible for inclusion as a component of the National Wild and Scenic Rivers System, a river or river segment must be in a free-flowing condition and possess at least one river-related value determined to be outstandingly remarkable (see Appendix I). These two Congressionally-established criteria are used to judge changes in resource conditions, particularly adverse changes. If resource management activities inherent to a specific alternative would alter flow characteristics of a study river segment, or degrade the segment's river-related outstandingly remarkable values, the change created by the actions allowed under that alternative would be adverse, and could result in a previously eligible river becoming ineligible.

Addressing first the effects of any proposed or reasonably foreseeable actions on flow characteristics, none of the BLM's management activities would adversely affect flow characteristics on any of the river study segments in any of the alternatives; however, Alternatives A and B would allow for the construction of the City of Klamath Falls' Salt Caves hydroelectric project on segment 2 of the upper Klamath River, which would affect the free-flowing condition of that river. As indicated in other places in this document, the City of Klamath Falls has submitted a new Salt Caves Project proposal to the

Department of Environmental Quality. Until the BLM sees the new proposal, analysis of effects of that new project are not possible. When a right-of-way application from the City of Klamath Falls is submitted the BLM will analyze the effects of the project for consistency with approved management plans, applicable laws and regulations, and resource management objectives. The analysis discussion below reflects the old project proposal.

The Salt Caves project would divert up to 2,400 cubic feet per second from the natural river channel (leaving 350 to 400 cubic feet per second in the channel) at the existing John C. Boyle Powerhouse (river mile 220.3), which is the beginning of segment 2 of the upper Klamath River, and would take it 9.7 miles downstream at a constant elevation (3,330 feet), where it would flow down penstocks back into the natural river bed near the Oregon-California border (river mile 209.9). Appendix N describes the Salt Caves hydroelectric project and its effects as evaluated by the Federal Energy Regulatory Commission in their 1990 final environmental impact statement on the Salt Caves project. The project mimics the existing John C. Boyle hydroelectric project, which begins with a dam and water diversion just above segment 1 of the upper Klamath River, where up to 2,500 cubic feet per second of the river's natural flow passes through an above-ground concrete flume, through a tunnel, and down penstocks through turbines at the John C. Boyle Powerhouse and back into the natural river channel. Because of the major modification of the waterway and the significant continuous diversion of water from segment 1, this segment was determined not to meet the definition of free-flowing in the National Wild and Scenic Rivers Act, and therefore does not meet the Act's eligibility requirements. Using this same justification, if the Salt Caves hydroelectric project were built, segment 2 of the upper Klamath River would not meet the free-flowing definition and therefore also would not be eligible for inclusion in the National Wild and Scenic Rivers System under Alternatives A and B. Based on criteria in the State Director's Guidance (Appendix C, issue 9A), none of the eligible river segments would be found suitable for designation under Alternatives A and B.

The effects on outstandingly remarkable values from BLM resource management activities would vary by alternative. Table 4-35 shows probable relative short-term changes, by alternative, in the condition of outstandingly remarkable values in each of the six river areas. The rationale supporting these conditional change determinations is presented in the suitability assessments for each study river (see



**Table 4-35. Probable Short-Term Changes in Outstandingly Remarkable Value Conditions for Study River Segments by Alternative.**

Study River Name	Highest Potential Classification	ORV <sup>1</sup>	Probable Changes by Alternative <sup>2</sup>						
			NA	A	B	C	D	E	PRMP
Miller Creek	Scenic	Scenic	0	-	0	0	+	+	+
Barnes Valley Creek	Scenic	Scenic	0	-	-	0	0	+	0
		Fish	0	0	0	0	0	0	0
Spencer Creek	Scenic	Fish	-	-	0	0	0	+	+
		Scenic	0	-	-	0	0	+	+
Antelope Creek (segment A)	Scenic	Prehistoric	0	0	0	0	0	+	0
Antelope Creek (segment C)	Scenic	Prehistoric	0	0	0	0	0	+	0
Upper Klamath River (segment 2)	Scenic	Historic	0	0	0	0	0	+	+
		Prehistoric	0	-	-	0	0	+	+
		Recreational	0	-	-	0	+	+	+
		Scenic	0	-	-	0	0	+	+
		Fish	0	0	0	0	0	0	0
		Wildlife NATU <sup>3</sup>	0	-	-	0	+	+	+

<sup>1</sup> Outstandingly remarkable values<sup>2</sup> + = beneficial

- = adverse

0 = none or negligible (see Appendix 2-E in the draft for supporting rationale).

<sup>3</sup> Native American traditional use area.

Appendix 2-E in the draft). The result of suitability determinations (number of segments and miles) are displayed in Chapter 2 (see Table 2-1).

The short-term effects on other outstandingly remarkable values within each river's study corridor are summarized by alternative as follows.

**Alternative No Action.** Under the Alternative No Action, the six river segments determined to be eligible for inclusion in the National Wild and Scenic Rivers System would receive interim protective management (described in Appendix 2-E in the draft) to specifically protect the outstandingly remarkable values until a final decision is made on whether they would be added to the National Wild and Scenic Rivers System. Most BLM-administered lands within the six study river corridors would continue to be managed by way of multiple-use prescriptions, as long as the outstandingly remarkable values are not adversely affected. While the eligibility of the study river segments would be maintained over the life of

the plan, some activities on BLM-administered land, such as timber harvest and livestock grazing, could still occur in the river corridors so long as the outstandingly remarkable values are protected. The outstandingly remarkable fish values in Spencer Creek would be degraded because of timber harvest activities on private lands that would adversely affect the creek's water quality. The classification potential for eligible rivers would not change under the Alternative No Action.

**Alternative A.** No river segments would be found suitable for designation under Alternative A. The proposed Salt Caves hydroelectric project could be constructed and operated on segment 2 of the upper Klamath River. The project's long-term effects are described in the Federal Energy Regulatory Commission Environmental Impact Statement (1990) and are not described here in any detail, the short-term effects are taken from the Federal Energy Regulatory Commission Environmental Impact Statement and are summarized in Appendix N. Habitat and populations

#### Chapter 4 - Environmental Consequences

of the native rainbow trout and shortnose and Lost River suckers would remain unchanged in the short term from construction and operation of the Salt Caves project; however, in the long term, the rainbow trout habitat and population would be enhanced and the sucker habitat and populations would be minimally negatively affected. Vegetation would be removed from approximately 250 acres during project construction; approximately 80 percent of the power conduit system would be buried and therefore would not be visible from the river; the buried conduit route would be visible due to the extensive cut and fill slope disturbance. All of these effects in combination would adversely affect the outstanding scenic value in the Klamath Canyon, reducing it to a less than outstandingly remarkable condition.

Wildlife habitat would be lost or modified on approximately 240 acres. As mitigation, a habitat management program for 2,066 acres is proposed by the City of Klamath Falls (the project's applicant). Other mitigation measures, such as construction timing, are also proposed. Although the wildlife value would be affected, it would not be reduced to less than outstanding.

The recreational value would be reduced to less than outstanding (Federal Energy Regulatory Commission 1990). This would be primarily attributable to the reduction in flows in segment 2 of the upper Klamath River and the presence of project-associated structures, both of which would affect the recreational experience, as well as fishing, rafting, and other opportunities.

Six prehistoric (cultural) sites would be directly affected and six additional sites would be indirectly affected from construction of the hydroelectric project (Federal Energy Regulatory Commission 1990). Although one of the directly affected sites is a village site with national significance, the prehistoric values would remain outstandingly remarkable. These effects would be an irreversible and irretrievable commitment of resources. Historic values would not be affected.

The Native American traditional use value is comprised of a combination of all the values in the canyon. As previously described, in the short term the fish, prehistoric, wildlife, and historic values would remain outstandingly remarkable and the scenic and recreational values would be reduced to less than outstanding. This, in combination with the changed river flows, presence of project-related structures, and extensive cut and fill slope disturbance, the Native American traditional use would be reduced to less

than outstanding. Although there would still be at least one outstandingly remarkable value in the river corridor, the free-flowing character of the upper Klamath River would be adversely affected (as described previously), resulting in segment 2 no longer meeting the definition of free-flowing and therefore would no longer be eligible for inclusion in the National Wild and Scenic Rivers System.

Outside the riparian management areas prescribed under Alternative A, BLM-administered lands within the six study river corridors would continue to be managed by way of multiple-use prescription. During the life of the plan it is probable that timber harvest would occur in the corridors of the Miller, Barnes Valley, and Spencer creeks, and the upper Klamath River. This could reduce the outstandingly remarkable values to less than an outstandingly remarkable condition (see Table 4-35). Timber harvest on private lands along Spencer Creek would adversely affect the water quality, which would degrade the outstandingly remarkable fish value. Intensive grazing would occur on BLM-administered lands in all of the river corridors, which could degrade the riparian zone, but would not degrade the outstandingly remarkable values to less than outstandingly remarkable.

**Alternative B.** No river segments would be found suitable for designation under Alternative B. The proposed Salt Caves hydroelectric project could be constructed and operated on segment 2 of the upper Klamath River. The project's effects are the same as those described for Alternative A. Outside the riparian management areas prescribed under Alternative B, most BLM-administered lands within the study river corridors would continue to be managed by way of multiple-use prescription. Timber harvest would not be planned in the upper Klamath River or Miller Creek corridors; however, salvage harvest could be allowed. Scenic values in the Miller Creek corridor would remain unchanged from the area of critical environmental concern designation and restrictions on grazing and mineral leasing. Scenic values in the corridors along Barnes Valley and Spencer creeks could be reduced to less than outstandingly remarkable from timber harvest or other prescribed management activities. The Barnes Valley Creek outstandingly remarkable fish value would not be reduced to less than outstandingly remarkable from timber harvest or other prescribed management activities because of the protections given to special status species under the Endangered Species Act and riparian buffers. Livestock grazing would still occur in the upper Klamath River and Antelope Creek corridors, but would not adversely affect the outstandingly remarkable values.

**Alternative C.** Under Alternative C, the upper Klamath River would be the only river found suitable for designation as a recreational river area (its highest classification is as a scenic river area). A wider range and level of land uses and management practices would be allowed under a recreational than a scenic classification (see Appendix I); however, the outstandingly remarkable values would remain unchanged. Scenic values on Miller Creek would remain unchanged by its area of critical environmental concern designation and associated management actions. Restrictions on timber harvest, livestock grazing, and off-highway vehicle use in the Spencer Creek corridor would enhance its scenic value. Livestock grazing and other prescribed management activities would still occur along Antelope and Barnes Valley creeks, but would not affect the outstandingly remarkable values. None of the outstandingly remarkable values would be adversely affected in the short term from management activities on BLM-administered lands.

**Alternative D.** Under Alternative D, the upper Klamath River would be the only river found suitable for designation as a scenic river area under the National Wild and Scenic Rivers Act. The outstandingly remarkable values in the Klamath River area would remain unchanged or be enhanced by designation as a federal scenic river area and as an area of critical environmental concern. Outstandingly remarkable values on Miller Creek (scenic value) and Spencer Creek (scenic and fish values) would be enhanced or remain unchanged by their area of critical environmental concern designations and associated management actions. Livestock grazing and other management activities could still occur on BLM-administered land in the Antelope and Barnes Valley Creek corridors, but would not adversely affect the outstandingly remarkable values.

**Alternative E.** Under Alternative E, all six eligible river segments would be found suitable for designation under the National Wild and Scenic Rivers Act; therefore, short-term management activities would not affect either the eligibility status or the highest potential classification of any study river segment. In the short and long term, the outstandingly remarkable values would either remain the same or would be enhanced (see Table 4-35).

**The Proposed Resource Management Plan.** Under the Proposed Resource Management Plan, the upper Klamath River would be the only river found suitable for designation. The outstandingly remarkable values in the Klamath River corridor would remain unchanged or would be enhanced by designation as a federal scenic river and as an area of critical

environmental concern. The outstandingly remarkable values in Miller Creek corridor would remain unchanged or be enhanced in the short term through its management as an area of critical environmental concern. The outstandingly remarkable fish values in Spencer Creek would be protected through Riparian Reserve management as part of the Aquatic Conservation Strategy. The outstandingly remarkable values in Barnes Valley and Antelope Creek corridors would not be adversely affected in the short term from activities on BLM-administered land.

## Summary

One or more outstandingly remarkable values in the Klamath River Canyon would be diminished under Alternatives A and B if the Salt Caves hydroelectric project were built; the outstandingly remarkable values in the Klamath River Canyon would be protected in the short term under Alternative No Action and in the long term under Alternatives C, D, E, and the Proposed Resource Management Plan. The outstandingly remarkable scenic value in the Miller Creek corridor would be protected through interim protective management under Alternative No Action and through area of critical environmental concern management under Alternatives B, C, D, and E, and the Proposed Resource Management Plan, but could be diminished under Alternative A from activities on BLM-administered land. The outstandingly remarkable fish value in Spencer Creek would be protected through area of critical environmental concern management under alternatives B, C, D, and E, but could be diminished under Alternatives No Action and A from timber management activities on private lands (cumulative effects). The outstandingly remarkable fish values in Spencer Creek would be protected through Riparian Reserve management as part of the Aquatic Conservation Strategy. The outstandingly remarkable scenic value in the Barnes Valley Creek corridor could be diminished under Alternatives A and B, but would remain unchanged in Alternatives No Action, C, D, E, and the Proposed Resource Management Plan. The outstandingly remarkable fish values in Barnes Valley Creek would not be diminished under any of the alternatives. The prehistoric outstandingly remarkable value in the Antelope Creek corridor would not be diminished under any alternative.

## Effects on Wilderness

The Mountain Lakes Wilderness Study Area (330 acres) would be managed according to the BLM's Wilderness Interim Management Policy until the

Congress acts to designate or release the area as wilderness. Values associated with this area would be protected until a congressional decision is made, regardless of which alternative is chosen.

To minimize the adverse effects from wildfire suppression under all the alternatives, the area would receive conditional fire suppression treatment with restrictions on the use of earth moving equipment. Prescribed fire or planned ignition would not be allowed in the area. This level of protection is outlined in the *Mountain Lakes Wilderness Study Area Fire Management Plan*.

If released by the Congress, under Alternative A the Mountain Lakes Wilderness Study Area would be available for a variety of uses, including timber harvest and road construction. Effects of this allocation would be that the existing roadless area values and associated wilderness values could be irreversibly lost. Under Alternatives No Action, B, C, D, and E, the area would continue to be managed for the retention and maintenance of old growth, mature forest, and habitat diversity. Under the Proposed Resource Management Plan the area would be managed as a Late-Successional/District Designated Reserve. No cumulative effects are expected under any alternative chosen.

## Effects on Recreation

People visit BLM-administered land to gain a variety of outdoor recreation experiences. The types of experiences gained depend upon a combination of three factors: environmental (developed versus undeveloped landscape), managerial (less versus more restrictions), and social (fewer or greater contacts with other visitors). In the planning area, the primary variation by alternative is the relative change in the proposed development of recreation sites and trails to meet or exceed anticipated demand. Another variation is the amount of emphasis on motorized versus nonmotorized recreation in special recreation management areas.

Under all alternatives, dispersed recreation activity on BLM-administered lands throughout the planning area would increase as visitor use demands increase. Table 4-36 shows anticipated capacity of BLM-administered land to meet the projected demand for 11 major dispersed use categories for each alternative. Although levels of use might change between alternatives, the differences are anticipated to be minor. Bureau of Land Management-administered

land, water, and the existing transportation system which provides extensive access would not exceed capacity during the life of the plan for many recreation activities under any alternative. Even Alternatives D and E, which would limit motorized vehicle use to main roads in many areas, would continue to provide more than adequate opportunities for public participation in many of the dispersed recreation activities with no appreciable deterioration in experience quality. Effects are discussed for the short term (the life of the plan), unless otherwise noted.

As shown in Table 4-36, projected demand for all recreation uses would be met under the Proposed Resource Management Plan. This conclusion appears valid even though the Final Supplemental Environmental Impact Statement (Supplemental Environmental Impact Statement Team 1994) indicates that the supply of landscape settings with little development, little management activity, and no motorized access would not meet anticipated demand over the short term. This Final Supplemental Environmental Impact Statement assessment considered recreation needs in terms of total acres within specific settings. In addition, the Final Supplemental Environmental Impact Statement applied only to those lands on the west side of the Klamath Falls Resource Area. The east side of the Klamath Falls Resource Area contains several areas available for nonmotorized access (Swan Lake Rim, Miller Creek). Table 4-36 on the other hand, considers recreation demand in terms of total visitation by specific activity groupings. These separate evaluations cannot be compared for consistency since the conclusions reached are based on very different sets of data.

The designation of the Klamath River as a wild and scenic river would have no significant effect on recreation. Visitor use could increase slightly as a result of designation, as has been documented on some other designated rivers. However, this increased use would not significantly effect the recreation resources in the Klamath River canyon. Table 4-36 has been footnoted to show that no adjustments have been made to the projected recreation demand to reflect the potential Wild and Scenic River designation of the Klamath River. The issue of recreation and increased visitor use in the Klamath River canyon will be addressed in a revised recreation area management plan, similar activity plan, Wild and Scenic River plan if designated, and/or appropriate National Environmental Policy Act decision.

**Alternatives No Action and A.** Under Alternatives No Action and A projected demand would be met for



**Table 4-36. Anticipated Short-Term Capability of BLM-Administered Facilities and Resources to Meet Projected Recreational Demand for 11 Major Use Categories by Alternative.**

Recreation Use Category <sup>1</sup>	Projected Demand (in visits for year 2000) <sup>2</sup>	Anticipated Capacity to Meet Demand:						
		NA	A	B	C	D	E	PRMP
Off-highway travel (such as driving motorcycles, all terrain vehicles, and 4x4 vehicles off the paved road).	31,000	yes	yes	yes	yes	no	no	yes <sup>3</sup>
Motorized travel (such as sightseeing and exploring).	52,700	yes	yes	yes	yes	yes	yes	yes
Nonmotorized travel (such as bicycling off-road day hiking/backpacking on trails, and horseback riding).	35,500	no	no	no	yes	yes	yes	yes
Camping	37,700	yes	yes	yes	yes	yes	yes	yes
Hunting	20,400	yes	yes	yes	yes	yes	yes	yes
Other land-based use (such as picnicking, outdoor photography, visiting interpretive displays, studying nature, and viewing wildlife).	61,800	no	no	no	yes	yes	yes	yes
Fishing	31,400	yes	yes	yes	yes	yes	yes	yes
Boating	12,200	yes	yes	yes	yes	yes	yes	yes
Other water-based use (such as swimming, general waterplay, and tubing),	15,300	yes	yes	yes	yes	yes	yes	yes
Winter sports (such as cross-country and downhill skiing, snowshoeing, and sledding/snowplay).	6,800	no	no	yes	yes	yes	yes	yes
Snowmobiling and winter all terrain vehicle riding.	4,900	yes	yes	yes	yes	yes	yes	yes
<b>TOTAL</b>	<b>309,700</b>							

<sup>1</sup> Source: USDI - Bureau of Land Management, Recreation Management Information Systems, BLM manual section 8300.

<sup>2</sup> Extrapolated from: (Hospodarsky 1989); The Pacific Northwest Outdoor Recreation Consumption Projection Study: Oregon Project, Final Report. Oregon State University. No adjustments have been made to the projected demand figures to reflect the potential Wild and Scenic River designation for the upper Klamath River. The designation of the Klamath River as a Wild and Scenic River would have no significant effect on recreation.

<sup>3</sup> Likely to meet.



#### Chapter 4 - Environmental Consequences

all recreation uses except nonmotorized travel, other land-based use, and winter sports (see Table 4-36). Demand for nonmotorized travel (hiking, backpacking, horseback riding, and mountain biking), interpretive displays or other land-based recreation activities (studying nature, viewing wildlife, or environmental education), and winter sports (downhill and cross country skiing, snowshoeing and sledding/snowplay), would not be met.

Projected demand for nonmotorized travel and winter sports are primarily related to developed or dedicated trail systems, and would not be met because adequate trails were not included under the Alternative No Action and they would conflict with allocations for commodity uses, such as timber harvest under Alternatives No Action and A. Projected demand for developed interpretive facilities would not be met because only three developed recreation sites (Topsy, Gerber, and Klamath River put-in) and two short sections of trails would be managed and/or retained under Alternatives No Action and A.

Additional sites along the upper Klamath River and in the Gerber Block (Potholes area) would need to be developed to alleviate this recreation demand shortfall. Not developing any new recreation sites or trails under these alternatives would adversely affect visitor experience expectations to the point that participation in nonmotorized travel use, winter sports use, and viewing interpretive displays or other land-based activities would be sought on lands managed by other governmental agencies and/or the private sector. Thus Alternatives No Action and A would not meet the BLM Recreation 2000 goal of providing a broad spectrum of public land recreation to meet the needs and desires of public land visitors.

Contributing to these recreation demand shortfalls, Alternatives No Action and A would not allocate lands for any of the five potential special recreation management areas, thus precluding the development of some associated recreation sites, facilities, and trails. Timber harvest would not adversely affect either dispersed motorized or facility-dependent recreation opportunities. There could be short-term effects on recreation if substantial harvest or other surface-disturbing activities occurred within or near potential recreation sites or existing sites, such as Surveyor and Gerber recreation sites and Gerber hunter camps and trails. If a site's value for possible future development and management is lost, there would be an irreversible and irretrievable commitment of resources. Timber harvest, road construction, hydroelectric development, or other surface-disturbing activities in areas that are presently unroaded or

have very primitive roads (such as the upper Klamath River and Swan Lake Rim) would have both short- and long-term negative effects on those recreationists seeking unstructured, dispersed nonmotorized; or semi-primitive motorized recreation experiences; however, these additional roads, along with minimal off-highway vehicle limitations would benefit motorized travel and off-highway vehicle travel recreation uses.

**Alternative B.** Under Alternative B, projected recreation demand would not be met for nonmotorized travel (relating to developed or dedicated trails) or other land-based use (relating to developed sites for interpretation, studying nature, or viewing wildlife) (see Table 4-36). Topsy, Gerber, and Surveyor recreation sites and two short sections of trails would be maintained, and development of winter sports trails on Hamaker Mountain public domain lands could occur; however, this still would not meet the projected demand.

Additional recreation sites along the upper Klamath River and Gerber Block (Potholes area), and trails in the Klamath River Canyon and on Swan Lake Rim would need to be developed to meet the demand. Not developing any potential trails or several potential interpretive sites under this alternative would adversely affect visitor experience expectations to the point that participation in facility-dependent recreation activities would be sought on lands managed by other governmental agencies and/or the private sector. Contributing to this is that Alternative B would allocate only one of five potential special recreation management areas (Hamaker Mountain), thus eliminating the development of additional potential recreation sites, trails, and facilities associated with special recreation management area allocation and management. Thus Alternative B probably would not meet the BLM Recreation 2000 goal of meeting the needs and desires of public land visitors.

Under Alternative B, there could also be short-term negative effects if substantial timber harvest or other surface-disturbing activities occurred within or near potential recreation sites, Gerber hunter camps, or the Pacific Crest Trail. If a site's value for future development and management is lost, there would be an irreversible and irretrievable commitment of resources. Timber harvest, road construction, and other surface-disturbing activities (including hydroelectric development) in areas that are presently unroaded or have very primitive roads would have both short- and long-term effects to those recreationists seeking unstructured, dispersed nonmotorized; or semi-primitive motorized recreation experiences; however, these additional roads would

benefit motorized travel and off-highway vehicle travel recreation uses.

For both Alternatives A and B, the Salt Caves hydroelectric project could be constructed, with both positive and negative effects for recreation. Recreation mitigation as part of the Salt Caves project would help meet a demand for non-motorized trails and semi-primitive camping, fishing and other land based activities.

The proposed Salt Caves hydroelectric project could be constructed under Alternatives A and B and could potentially affect recreation resources in the upper Klamath River canyon. Long-term effects of the project on recreation can be found in the 1990 Federal Energy Regulatory Commission Environmental Impact Statement and short-term effects are summarized in Appendix N.

**Alternative C.** Under Alternative C, projected demand would be met for all uses if several additional trails for nonmotorized and winter sports use, and several potential sites for interpretation and other land-based use activities were developed (see Table 4-36). Trails would be developed in at least three of the following areas to meet the demand for nonmotorized use: upper Klamath River, Gerber Block area (Potholes and Miller Creek), Surveyor recreation site (Johnson Creek), Spencer Creek, Swan Lake Rim, Stukel Mountain, Hamaker Mountain, and Bryant Mountain. The development of trails on Hamaker Mountain would alleviate the demand for winter sports use. Recreation sites would be developed in three of the following areas to meet the demand for other land-based use: upper Klamath River, Gerber Block (Potholes), Surveyor recreation site, Hamaker Mountain, or along Highway 66. Management actions carried out under this alternative are not expected to adversely affect the experience expectations of most recreationists; however, the management of areas, such as Swan Lake Rim, for semi-primitive motorized recreation experiences would affect those recreationists seeking a non-motorized recreation experience setting in that area.

Road closures and off-highway travel limitations in many areas would decrease visitor participation in these activities; however, the majority of lands would be available for motorized and off-highway vehicle use, and therefore, there would be minimal negative effects to those recreationists seeking motorized or off-highway vehicle use. Areas beyond road closures would remain open to and benefit those people seeking non-motorized recreation experiences.

**Alternatives D and E.** Under Alternatives D and E, projected demand for all recreation uses except for dispersed recreation activities related to off-highway travel (driving motorized vehicles off the network of paved roads) would be met (see Table 4-36). Road closures and off-highway travel limitations in many areas would decrease visitor participation in these activities; however, participation in activities not usually compatible with intensive off-highway use would increase. Hunting, hiking, horseback riding, studying nature, and viewing wildlife are all activities that would benefit by selective road closures and off-road travel restrictions in areas that provide these opportunities. Other than off-highway travel activity in selected areas, management actions under Alternatives D and E are not expected to adversely affect the experience expectations of recreationists for activities dependent on developed recreation facilities. The development of additional trails for nonmotorized and winter sports use, and of potential sites for interpretation and other land-based recreation activities would be expected to meet recreation demand.

**The Proposed Resource Management Plan.** Under the Proposed Resource Management Plan, projected demand would be met for all uses if several additional trails for nonmotorized and winter sports use, and several potential sites for interpretation and other land-based recreation activities were developed (see Table 4-36). Additional trails would be developed in at least three of the following areas to meet the demand for nonmotorized use: upper Klamath River, Gerber Block area (Potholes and Miller Creek), Surveyor recreation site (Johnson Creek and Old Baldy), Spencer Creek, Swan Lake Rim, Stukel Mountain, and Bryant Mountain. The development of trails on Hamaker Mountain would meet the demand for winter sports and mountain bike use. Additional recreation sites would be developed in three of the following areas to meet the demand for other land-based use: upper Klamath River, Gerber Block (Potholes), Clover Creek, and Hamaker Mountain. Management actions under this alternative are not expected to adversely affect the experience expectations of most recreationists; however, the management of areas, such as Swan Lake Rim, for semi-primitive nonmotorized recreation experiences would affect those recreationists seeking a motorized recreation experience in that area. However, other nearby areas (Bryant Mountain, Stukel Mountain) contain suitable areas for development and designation of motorized off-highway vehicle trails. For the Hamaker Mountain area, lands available for timber management activities such as pre-commercial thinnings and brush control, would provide a cost-

effective and efficient means to develop a winter sports/mountain bike trail network. As those activities would be consistent with winter sports and mountain bike use, there would be positive short- and long-term benefits for recreationists.

Road closures and off-highway vehicle travel limitations in many areas would decrease visitor participation in these activities; however, many areas would still be available for motorized and off-highway vehicle use, and therefore, there would be minimal negative effects to those recreationists seeking motorized or off-highway vehicle use. Areas beyond road closures would remain open to and benefit those people seeking non-motorized recreation experiences.

Continuing the closure of Salt Caves, used by Townsend big-eared bats (federal candidate, category 2), could have an adverse effect on recreational spelunking. The existing emergency closure has displaced some recreationists, but it is anticipated the long term adverse effects from the closure would be minimal. The closure has primarily prohibited whitewater boaters from using the Salt Caves area, and has also affected a small amount of land based (hiking) use. The closure would continue to be seasonal, and other caves are available in the Klamath Basin for spelunking.

Restricting human activities that could disturb listed and proposed threatened and endangered animal or plant species could have an adverse effect on recreationists. If the threatened or endangered animal or plant species is located in or near an area of moderate or high recreation use, such as a recreation site, then the adverse impacts to recreationists could be significant. Activity restrictions or recreation area seasonal closures would force the displacement of recreationists to other areas or sites, if available, nearby.

The designation of the Klamath River Canyon as a National Archaeological District could have an adverse effect on recreation use in the Klamath River Canyon, if areas are closed or restricted to recreation use.

Grazing conflicts have been identified at several developed recreation sites and moderate to high use recreation areas (Appendix L). The negative effects from grazing include unpleasant concentrations of flies and unpleasant odors, along with the general negative public reaction to livestock within recreation sites or areas. For those grazing allotments where recreation conflicts exist, these conflicts will be addressed through range land improvements such as fencing, or season of use adjustments. These changes to grazing allotments would occur during

allotment management planning or other activity level planning, and the environmental effects from such changes analyzed at that time.

**Alternatives C, D, E, and the Proposed Resource Management Plan.** Under Alternatives C, D, E, and the Proposed Resource Management Plan, the protection of Gerber hunter camps and old growth forests adjacent to Surveyor recreation site from scheduled timber harvest and other surface disturbing activities would provide both short- and long-term positive benefits for recreation development and management.

Based on the Ten-year Representative Timber Management Scenarios under Alternatives D, E, and the Proposed Resource Management Plan, there could be short-term negative effects to nonmotorized recreationists if substantial timber harvest, road construction, or other surface disturbing activities were to occur in the unroaded areas in the Swan Lake Rim (Alternatives C and E only), and Bryant and Stukel Mountain areas (Alternatives D and the Proposed Resource Management Plan). If the area's ability to be managed for semi-primitive nonmotorized recreation experiences would be lost, then there would be an adverse irretrievable long-term effect.

## Summary

Under Alternatives No Action, A, and B, potential negative effects on recreation would occur through allocation of lands to commodity production. Overall effects would be negative as existing recreation sites and trails would not meet projected demand for the year 2000. Currently, BLM-administered lands providing unroaded or primitive roaded backcountry activities could be irretrievably lost through commodity production.

Under Alternatives C, D, E, and the Proposed Resource Management Plan, potential recreation sites and trails that meet or exceed demand have been identified for development. Lands would be allocated to existing special recreation management areas under all alternatives and to new special recreation management areas under Alternatives C, D, E, and the Proposed Resource Management Plan.

Alternatives D and E would provide the most protection to solitude values and more lands would be reserved for unroaded or primitive back country activities. Off-highway vehicle travel demand would not be met under Alternatives D and E due to off-highway vehicle road closures and restrictions.

## Effects on Timber Production

The sustainable timber production level for any alternative is a result of the set of land use allocations, harvest deferrals and landscape constraints, management restrictions, and silvicultural practices proposed under each alternative. Table 4-1 displays the probable sale quantity by alternative. In addition to the harvest levels displayed, it is estimated that an additional ten percent (ten percent) of this volume could be available as miscellaneous volume (harvest volume resulting from treatments made in lands not allocated to forest management/timber production. An example is thinning for stocking control in riparian management areas to achieve Aquatic Conservation Strategy objectives.). The effects of the alternatives on the timber supply and the results of sensitivity testing are discussed in the text of this section.

Amounts of timber produced may vary as a result of activities for the creation and maintenance of older forest conditions, specific wildlife habitat, or forest health restoration and as a result of processes such as watershed analysis and litigation.

### Effects of Land Use Allocations on Timber Production

Allocations of lands to timber production and other resources are displayed in Table 2-1. This section

discusses the effects of the allocation of woodlands and of suitable commercial forest land separately.

Allocations of suitable commercial forestlands under the Alternative No Action is based on the 1977 timber production capability classification inventory while other alternatives utilize a different strata of lands identified by the 1988 inventory. The probable sale quantity for the Alternative No Action was extrapolated from SIMIX (a model) calculations made for the previous decade while the other alternatives used TRIM-PLUS to estimate probable sale quantity (see Appendix 4-V in the draft Resource Management Plan). Consequently, some comparisons between the No Action and the other alternatives are extrapolations while other comparisons could not be made.

The overall effect of land use allocations on land available for timber production is shown in Table 4-37. For purposes of comparison, the Alternative No Action is shown as a percent of the suitable commercial forest lands established by the 1988 timber production capability classification.

Under Alternatives A and B, suitable woodland allocations on the westside would result in increases of .06 percent and .03 percent respectively over the probable sale quantity level which would result from allocation of the suitable commercial forest acres alone. For the east side, increases of 5.7 percent and 6.1 percent, respectively, would result. In all other alternatives, the suitable woodlands are not allocated to timber production, and do not contribute to the probable sale quantity.

**Table 4-37. Summary Effect of Allocations on Land Available for Timber Production.**

	Percent of Total Forest Acres Available for Timber Production						
	NA <sup>2</sup>	A	B	C	D	E	PRMP
<b>West Side</b>							
Suitable Commercial Forest Land	94	98	89	76	81	7	56
Forest Land <sup>1</sup>	83	87	79	67	72	6	49
<b>East Side</b>							
Suitable Commercial Forest Land	128	99	91	83	91	1	57
Forest Land <sup>1</sup>	28	26	25	18	20	0.3	10

<sup>1</sup> Includes woodlands and suitable commercial forest land.

<sup>2</sup> The Alternative No Action is shown as a percent of the suitable commercial forest lands established by the 1988 Timber Production Capability Classification



## Riparian Management Areas, Riparian Reserves

Acre allocations to riparian management areas and Riparian Reserves are shown in Table 2-1. On the west side, the riparian management areas under Alternatives D, E, and Riparian Reserves under the Proposed Resource Management Plan would have a high adverse effect on the availability of land for timber production with 10, 13 and 46 percent respectively of suitable commercial forest land allocated to riparian management areas or Riparian Reserves. Alternative C would have a moderate adverse effect with 6 percent of suitable commercial forest land allocated to riparian management areas. Alternatives No Action, A, and B would have the least effect with 1 percent, 3 percent, and 4 percent of suitable commercial forest land allocated to riparian management areas. On the east side, the riparian management areas under Alternatives C, D, E, and Riparian Reserves under the Proposed Resource Management Plan would have a high adverse effect on the availability of land for timber production, with 11, 18, 14, and 33 percent respectively of suitable commercial forest land allocated to riparian management areas or Riparian Reserves. Alternatives A and B would have a moderate adverse effect with 6 and 8 percent of suitable commercial forest land allocated to riparian management areas. Alternative No Action would have the least effect with 1 percent of suitable commercial forest land allocated to riparian management areas.

For the west side, sensitivity testing (see Appendix 4-A in the draft Resource Management Plan) indicated that riparian management area allocations used in alternatives B, C, and D would result in harvest levels of 0.3 percent, 0.2 percent, and 3.0 percent less (respectively) than would occur if the alternatives used the Alternative A riparian management area allocations. Alternative E was not subject to sensitivity testing, but riparian management area allocations for this alternative would have an effect somewhat higher than for Alternative D.

For the east side, sensitivity testing indicated that riparian management area allocations used in Alternatives B, C, and D would result in harvest levels of 2.3 percent, 3.0 percent, and 3.7 percent less (respectively) than would occur if the alternatives used the Alternative A riparian management area allocations. Again, Alternative E was not subject to sensitivity testing but riparian management area allocations for this alternative would have an effect somewhat higher for Alternative D.

Under the Proposed Resource Management Plan, the prescribed widths of Riparian Reserves are intended to be interim until the completion of watershed analysis. Post watershed analysis Riparian Reserves for permanently-flowing streams should approximate the boundaries prescribed in the Proposed Resource Management Plan. However, post-watershed analysis Riparian Reserve boundaries for intermittent streams may differ from those prescribed in the Proposed Resource Management Plan. Boundary adjustments may increase or decrease the amount of land available for timber production. Future Riparian Reserve boundary changes could potentially effect the probable sale quantity.

## Retention or Development of Older Forest

Acres allocated to the retention or development of older forests are shown in Table 2-1. Allocations of suitable commercial forest land to the retention or development of older forests in Alternatives No Action and A are relatively minor and would have little effect on probable sale quantity.

On the west side under Alternative D, allocation of approximately 1 percent of the suitable commercial forest land to northern spotted owl habitat conservation areas (80 acres owl pair sites, or habitat conservation area 4) would have a low adverse effect. Alternative C would have a moderate adverse effect with approximately 23 percent allocated to old growth retention and restoration blocks. A sensitivity test indicated this allocation would result in an allowable cut reduction of approximately 13 percent compared to management of these blocks under a high retention silvicultural system. The Proposed Resource Management Plan would also have a relatively low adverse effect with 4 percent of suitable commercial forest land acres allocated to Late-Successional/District Designated Reserves. Alternative B would have a low adverse effect with approximately 7 percent of suitable commercial forest land acres allocated to a series of seral diversity blocks.

Older forest classified as critical spotted owl habitat and located within Matrix lands, if unavailable for timber production, would reduce the net operable area by approximately 12,900 acres. A sensitivity analysis of the effects of excluding designated critical habitat from timber production indicated that a probable sale quantity reduction of over 2.6 million board feet annually (about a 44 percent reduction).



## Special Management Areas

Areas allocated to special management include known special status/supplemental environmental impact statement special attention species habitat (except the northern spotted owl), special areas (areas of critical environmental concern and research natural areas), recreation sites, and special habitats. Of these areas, allocations to special areas have the greatest effect on the availability of suitable commercial forest land for timber production. In Alternatives D and E special area allocations as a percent of the suitable commercial forest land are 6 percent, the Proposed Resource Management Plan and Alternative C are 5 percent, Alternative B is 4 percent, and Alternatives A and No Action have no special area allocations.

Allocations to special status and/or Supplemental Environmental Impact Statement special attention species habitat may increase as additional nest sites, roost sites, and associated foraging areas for such species as northern goshawks or American golden eagles, are discovered. The cumulative adverse impact of such additional allocations on timber production, could be significant for any alternative.

## Economically Marginal Lands

Under Alternatives A, B, C, D, and No Action, lands inventoried as economically marginal were among those allocated for timber production.

Under Alternative E, economically marginal lands would not be available for timber management. If these lands were allocated to timber production, the probable sale quantity would increase less than one percent. Under the Proposed Resource Management Plan, lands inventoried as economically marginal would not be planned for timber management under current conditions. If these lands were allocated to timber production, the probable sale quantity would increase less than one percent.

## Roads

Construction of permanent roads, landings, and rock quarries would reduce the total acres of land available to timber production. The amount of land occupied by permanent roads is an unavoidable adverse effect of timber management. The reduction in forest land acreage resulting from road construction would continue until all roads necessary for management are constructed. The length of time and the amount of road to be constructed would be related to the number of acres harvested and their spatial arrangement. Table 4-38 displays estimated miles of road construction annually by alternative. The reduction of forest land acres as a result of road construction could be largely offset by obliteration of unneeded roads and their conversion back to forest land.

Roads would be constructed across forest lands and lands allocated to other resources. On the west side, the greatest amount of road construction would be done under Alternatives No Action, A, B, D, and Proposed Resource Management Plan, and the least under C and E. On the east side, the greatest amount of road construction would be done under Alternatives No Action, A, B, C, and D, and the least under E and Proposed Resource Management Plan.

Designation of two new Back Country Byways would not impact the probable sale quantity as timber management activities along the byways would be similar to adjacent timber management lands.

## Effects of Harvest Deferrals and Landscape Constraints

It is possible that watershed analysis could indicate the need to defer timber harvest from individual watersheds. Until such analyses are complete, the number, size, and locations of watersheds to be deferred is unknown. The possibility of watershed

**Table 4-38. Miles and Acres of Road Construction (Annual).**

Alternative	Miles		Miles	
	West Side		East Side	
		Acres		Acres
PRMP	1.0	11	0.7	8
No Action	1.6	17	1.6	17
A	1.0	11	1.6	17
B	1.2	13	1.2	13
C	0.65	7	1.4	15
D	1.3	14	1.5	16
E	0.02	0.2	0.1	1

timber harvest deferrals and their magnitude is an uncertainty that is not reflected in the probable sale quantity calculation.

## Effects of Restrictions on Timber Management Practices

Restrictions on timber management practices to meet other resource objectives would have two important effects, reduction in timber production and increases in the cost of timber management. Table 4-39 shows which restrictions are felt to substantially affect timber production levels or costs.

Management restrictions incorporated in the designs of Alternatives C, D, and the Proposed Resource Management Plan would have the largest negative per acre effect on timber production and the cost of timber management. The systems used in Alternatives No Action, A, B, and E would have the least effect. Some management restrictions limit silvicultural treatments which would result in lower volume growth and sustainable harvest levels below the biological capability of the site.

The alternatives would vary substantially in the cost per thousand board feet of timber produced. In addition to the costs of mitigation through prescription complexity, volume per acre harvested would change substantially between alternatives and would result in

differences in costs of timber sale preparation and administration. It is estimated that the combination of overhead costs, silvicultural costs, and timber management costs could result in the highest production costs for Alternatives C and E and the lowest for Alternatives No Action, A, and B. The Proposed Resource Management Plan and Alternative D would have an intermediate production cost level.

The draft Resource Management Plan described a 5 percent "multiple use" reduction to be applied to the selected alternatives' probable sale quantity. This was intended to compensate for buffers necessary to protect cultural sites, threatened or endangered species sites, special wildlife habitats, and other significant resource values which were projected to be discovered during the life of the plan. Should Alternative No Action, A, B, C, D, or E be selected, the 5 percent reduction in the probable sale quantity would still be done. However, if the Proposed Resource Management Plan is selected, the 5 percent reduction would not be applied. The Proposed Resource Management Plan's probable sale quantity may vary by plus or minus 40 percent due to potential changes resulting from further land classification, stream inventory, and watershed analysis. It has been assumed that a reduced probable sale quantity resulting from new "multiple use restrictions" can be accommodated by the Proposed Resource Management Plan probable sale quantity range.

**Table 4-39. Summary Effect of Restrictions on Timber Resources.**

	NA	A	B	C	D	E	PRMP
VRM Class II Management	P,C		P,C		P,C	P,C	P,C
Management for biological diversity				P,C			P,C
Habitat Connectivity				P,C	P,C		P,C
Rural Interface			C		P,C	P,C	C
Snag retention and other mitigations for wildlife species				P,C	P,C	P	P,C
Fragile Soils						P	P,C
Soils and watershed protection	C	C	C	C	C	C	P,C
Intermittent second order stream protection					P	P	P,C

P - reduction in timber production.

C - Increased cost of timber management.

## Effects of Silvicultural Systems and Silvicultural Practices

Silvicultural systems and practices would affect long-term yield, reforestation success, long-term site productivity, wood quality, and risk of timber productivity loss to disease and insects. Tables 2-1 and 4-1 display estimated average annual acres of practices by alternative. Some practices are anticipated to occur regardless of land use allocation. Precommercial thinning/release and fertilization estimates given for the Proposed Resource Management Plan are an example of this. The acreages given are potential acres across all allocations. Practices would be designed to meet the objectives of the allocation and would be based on the appropriate level of watershed analysis. Appendix 2-C in the draft Resource Management Plan described silvicultural systems and practices for Alternatives A through E. Appendix G describes silvicultural systems and practices in the Proposed Resource Management Plan.

Increases in timber harvest associated with growth-enhancing practices are considerably less than the long-term yield effects. This is because sufficient surplus merchantable volume is not available to accelerate harvests in the decades prior to these higher volume stands reaching minimum harvest age (for a discussion of the allowable cut effect see Appendix 2-C in the draft Resource Management Plan). Alternatives No Action, A, and B would receive the largest probable sale quantity increase from intensive silvicultural practices and Alternatives C, D, E, and the Proposed Resource Management Plan would receive the least (see Appendix 2-C in the draft Resource Management Plan).

A sensitivity test was conducted for the west side to show the effect of silvicultural practices on probable sale quantity for the Proposed Resource Management Plan. The use of genetic stock and fertilization were assumed as contributing no increase in yield or probable sale quantity. However, if no pre-commercial thinning or release were done, the west side probable sale quantity would be reduced by 5 percent.

Reforestation success would not be expected to differ between the Alternative No Action and Alternatives A and B. However, under Alternatives A and B the high level of harvest on lower elevation lands would require more intensive silvicultural design and treatments as well as greater operational costs than for the other alternatives.

An improvement in reforestation results over the Alternative No Action for all other alternatives would

occur as a result of the shift to shelterwood retention systems for frost-prone environments.

Alternative C and the Proposed Resource Management Plan would likely show an improvement in reforestation success over the No Action, A, and B because of greater reliance on ecosystem-based approaches. These approaches would result in lower levels of herbaceous, shrub, and hardwood competition and would rely to a greater extent on natural regeneration. A higher level of uncertainty exists, however, for the partial cut prescriptions within Alternatives C, D, E, and the Proposed Resource Management Plan because of the lack of designed research on these prescriptions.

All suitable commercial forest land proposed for timber production under any alternative is capable of being reforested within five years of harvest. Under all alternatives, it is assumed that harvested areas will usually be reforested within one growing season after site preparation, with an adequate number of seedlings of suitable tree species. Reforestation estimates do not project full stocking to target levels on all harvested acres, but assume that high levels of reforestation success will continue.

**As described under Effects of Land Use Allocations,** experimental harvests proposed for woodlands under Alternatives A and B would be conducted to determine their reforestability under a variety of silvicultural approaches. While the results of such research is uncertain, observations indicate these lands would regenerate using silvicultural approaches similar to those proposed for Alternative C and the Proposed Resource Management Plan. However, site preparation and vegetation-management treatments would be required. Harvest of west side woodlands would result in an increase in the probable sale quantity of 9 thousand board feet in Alternative A and an increase of 4 thousand board feet in Alternative B. Harvest of east side woodlands would result in a probable sale quantity increase of 79 thousand board feet in Alternative A and an increase of 79 thousand board feet in Alternative B.

Reforestation results for stand conversion units under Alternatives A and B would be expected to be similar to those achieved in reforesting conifer harvest units however a higher level of vegetation management would be required. Stand conversion would be difficult without the use of herbicides.

Forest condition restoration treatments under the Proposed Resource Management Plan (thinning, understory reduction, underburning, plant community restoration, and fertilization) would increase vigor of

## Chapter 4 - Environmental Consequences

residual stands, reduce mortality, shift species composition to site-adapted species, reduce thinning shock, and reduce fire hazard. Forest and ecosystem health would be improved (see also Effects on Forest/Ecosystem Health section).

Some silvicultural systems have the potential to negatively affect long-term site productivity and long-term timber yields (Perry and Maghembe 1989); however, research has not progressed to a point where quantification of effects is possible. Possible risks to long-term timber yields are as follows.

- ◆ Under Alternatives No Action, A, and B, shorter rotations could lead to a more rapid depletion of nitrogen in forest soils.
- ◆ Alternatives No Action, A, B, and D could have negative effects on long-term sustainability because their silvicultural systems reduce biological diversity. Studies indicate that mycorrhizal fungi and nitrogen fixing soil organisms are associated with the presence of certain hardwood species (Borchers and Perry 1990; Amaranthus and Perry 1990). However, while the Alternative No Action does not provide for retention of hardwoods in managed stands, hardwoods have survived in the past under such prescriptions.
- ◆ Simplification of ecosystem processes associated with repeated cycles of intensive management under Alternatives No Action, A, and B could result in less resistance to insect pests and pathogens and less ability to adapt to changing environmental conditions such as a potential long-term climate change or increased levels of air pollution (Franklin et al. 1989).

Evaluation of these risks indicate that ecosystem-based silvicultural systems such as those used in Alternatives C and the Proposed Resource Management Plan, which involve longer rotations, retention of higher species and structural diversity, and the incorporation of ecosystem processes within the silvicultural system, pose the least threat for loss of future yields.

Silvicultural systems and rotation lengths have the potential to affect future wood quality and stumpage values (see Appendix W). Wood quality would be higher under the longer rotations proposed for the Proposed Resource Management Plan and Alternative C than the other alternatives. Partial cut silvicultural regimes planned under Alternatives C, D, and the Proposed Resource Management Plan carry some risk of decreased wood quality in the long term

because of logging damage to reserved trees and introduction of or increases in tree disease.

It is assumed pruning would be conducted under all alternatives, except No Action and E, and would contribute substantially to wood value. The practice would be most appropriate in Alternative C because of the effect of thinning on crown length and limb retention.

Silvicultural systems could influence the risk of insect and disease in managed stands. Timing of thinning treatments, species selection, and other practices common to all the alternatives reduce the risk of root diseases. Risks include:

- ◆ Partial harvest regimes such as shelterwood retention regimes in Alternatives A, B, and E and systems used in Alternatives C, D, and the Proposed Resource Management Plan retain understory trees and have a higher potential to spread mistletoe and other diseases to new conifer stands;
- ◆ Thinning and partial cutting under all alternatives, particularly in white fir stands, can result in damage to tops, crowns, bark, and roots of residual trees, thereby reducing wood quality, and increasing the risk of volume loss to insects and disease; and
- ◆ Silvicultural systems featuring frequent stand entries, such as the Proposed Resource Management Plan and the high retention prescriptions in Alternative C tend to result in the highest amount of stem and root damage and the introduction of disease into stands.

## Effects of Retaining Stand Structure

Under Alternatives C, D, E, and the Proposed Resource Management Plan, various levels of live trees and/or snags would be retained within harvest areas. These trees would provide a source of future snags and/or elements of structural diversity.

When merchantable trees and down woody material are reserved within harvest areas, there would be a reduction in yield to account for volume not being removed. Where overstories were retained, there could be an additional reduction in growth of the understory. In general, growth reductions caused by an overstory would depend upon how retained trees were distributed, the size of the retained trees, and the aspect, size, and shape of the harvest unit.



Retained trees have the potential to transmit both desired and undesired genetic traits to subsequent stands (see also Appendix G). Retained structures do contribute to the maintenance of biological diversity.

## Effects of Mortality Salvage and Sanitation Salvage

Mortality salvage is designed to recover mortality volume that would otherwise be lost to decay (material needed to meet snag and down woody debris requirements would not be eligible for salvage). Sanitation salvage also removes high risk trees. Salvage volume would be substituted for regular green volume and would have no effect on sustainable timber yield. Sanitation salvage, density management, and prescribed burning treatments proposed under Alternative C and the Proposed Resource Management Plan could result in lower levels of future salvage harvests.

The manner in which salvage operations are conducted could affect subsequent silvicultural treatments and systems.

## Effects of Land Exchanges

Under all alternatives, efforts would be made to negotiate land exchanges to permit better and more efficient management of BLM-administered land. The probable sale quantity could be affected if land exchanges result in changes in standing timber volumes, acres, age classes, or site conditions.

## Effects of Prescribed Fire

Prescribed fire would be used to reduce stand densities and fuel loadings to levels within the range of natural variability and to favor species genetically adapted to the site and habitat type. These effects would vary with intensity and other parameters. The greatest benefit of prescribed fire would occur under Alternatives E and the Proposed Resource Management Plan which allow the largest amount of acreage per year to be treated. Alternatives No Action, A, and B allow for a moderate level of prescribed fire to be used which would result in a slight to moderate benefit to forested stands. Alternatives C and D allow for increased levels of prescribed fire which would result in increased benefits relative to No Action, A, and B. For a more thorough discussion on the effects of prescribed fire, see Effects on Forest/Ecosystem Health section and Figure 2-2 Proposed Forest Condition Restoration Treatments.

## Effects of Cultural Resources

Cultural resources would affect harvest levels by either restricting or eliminating harvest of timber products on commercial forest lands near cultural sites. Alternatives C, D, E, and the Proposed Resource Management Plan encourage exchanges with private landowners to protect known sites. These exchanges could have an effect on commercial forest land base. Under all the alternatives, adequate protective measures are required around cultural sites in order to maintain the contemplative quality of the site. In areas where the cultural site is located on commercial forest lands, buffers may be used to protect the site which result in a reduction of the commercial forest land that can be harvested. Buffers and other protective measures are based upon an archaeologist's professional judgement, BLM policy, and requests by Native American tribal organizations. Presently identified cultural sites would only have a slight impact on timber harvest. Traditional use sites often cover extensive acreage, and, depending on the use, may or may not affect harvest activity. Additional commercial forest land could be withdrawn and harvest levels reduced through the life of this plan based upon new surveys and identification of additional sites.

## Effects of Mineral Development

Mineral development generally has little adverse effect on the timber resource. Mining activities usually occur in areas not suitable for timber production or in riparian areas where timber practices are already limited. Development of mineral resources could, however, potentially damage research sites.

## Effects of Grazing

Negative effects of livestock, wild horse, and wildlife grazing include soil compaction and the trampling and direct browsing of young trees. Positive effects include the grazing induced suppression of understory plants which compete with young trees. The effects of grazing is directly related to the number of grazing animals present. With livestock specifically, the effects are proportional to the numbers of cattle permitted to graze an allotment and the grazing season of use. Given a similar intensity of use, early season (spring - early summer) grazing is more suppressive to grass and forb growth than later grazing. Young tree consumption is more prevalent with late season-of-use grazing (late summer and fall use) as livestock tend to seek out green feed in this season when many plants go dormant and dry out. Young trees (and shrubs) tend to be in the small



## Chapter 4 - Environmental Consequences

group of plants that stay green throughout the grazing season. Under Alternatives No Action, A, and B the effects would be greater than under Alternatives C, D, E, and the Proposed Resource Management Plan

### Effects of Harvest Unit Seeding

Table 2-1 lists the amount of harvested acres that would be seeded with grasses or legumes for forage production. Effects on timber production could vary from no effect to high adverse effect depending on the type and amount of seed used. Conifer seedling survival is highly dependent on soil moisture, and grasses are one of the main competitors for this moisture. A heavy grass and forb cover can deny moisture to conifer seedlings, resulting in heavy mortality. If the maximum seeding planned for each alternative is done, Alternative No Action would have no adverse effect, Alternatives A and B would have a moderately adverse effect (at 25 percent of harvest acres seeded), and Alternatives C, D, and E would have a highly adverse effect on seedling survival. The Proposed Resource Management Plan would have an adverse effect, since up to 40 percent of harvest acres could be seeded.

### Effects of Timber Supply

During the 1984 to 1988 baseline period, timber harvest from BLM lands in the Klamath Falls Resource Area constituted 3.5 percent of harvest in Klamath County. The alternatives, compared to the total harvest during the baseline period in Klamath County, would range from 3.7 percent (No Action) to 0.2 percent (E). Due to the small proportion of timber supplied from BLM lands, the variation in timber supply from BLM lands resulting from choice of an alternative would be exceeded by normal variations in the supply caused by other market and resource factors.

The cumulative effects of the alternatives are shown in Table 4-40. This table shows projected timber harvests in western Oregon based on the assumption that each BLM district adopts the same alternative. The table does not include harvests in Klamath County because BLM's share of total harvests is very small. Compared to the 1984 to 1988 baseline, BLM harvests would range from a 26 percent increase in Alternative A to an 82 percent decrease in the Proposed Resource Management Plan. Total harvests in western Oregon would decline under all alternatives, principally due to decreases in harvests on the National Forests attributable to the Supplement Environmental Impact Statement. Total harvests would also decrease in all of the alternatives in the

2001 to 2010 time period, through they would be greater than harvest during the 1993 to 2000 time period.

Timber processed in western Oregon during the 1993 to 2000 period would decrease under all alternatives. Logs exported overseas are not excluded from this total.

### Summary

The level of probable sale quantity would be highest under Alternative No Action and lowest under Alternative E.

The probable sale quantity is projected at sustainable levels for all alternatives so no differences exist in short- and long-term timber harvest levels. However, some risk exists for the sustainability of site productivity in the long term under Alternatives No Action, A, B, D, and E. This could affect timber production in the future. Research data is not sufficient to permit quantification of this risk. Alternatives C and the Proposed Resource Management Plan use silvicultural systems which that would reduce the risk of ecosystem productivity loss in the long term.

The largest effect on timber production probable sale quantity would result from allocations of land as available or not available for timber production. Across the range of alternatives, allocations to RMAs, Riparian Reserves, older forests, and to old growth or habitat for northern spotted owls and other late-successional and old growth associated species habitat would have the largest negative effect on probable sale quantity, most noticeably in Alternatives D, and E, and the Proposed Resource Management Plan. The next largest effect would result from management restrictions and from the use of silvicultural systems which result in stand growth and harvest below the biological capability of the forest site. These systems have their largest negative effect in Alternatives C and D but also restrict harvest levels in the Proposed Resource Management Plan.

Deferrals from timber management and landscape constraints have a relatively minor effect on timber production. There is potential however, for effects on timber production from landscape constraints.

Growth enhancing practices including precommercial thinning, release, fertilization, and genetics have a comparatively minor positive effect on timber harvest levels. For the Proposed Resource Management Plan, they account for five percent of the west side probable sale quantity.

Table 4-40. Western Oregon Timber - Millions of Cubic Feet (MMCF) per Year<sup>1</sup>

Supplier	1984 - 88 Baseline	NA	A	B	C	D	E	PRMP
<b>Timber Harvest (1993 to 2000)<sup>2</sup></b>								
BLM	199	187	250	224	67	74	56	35
USFS <sup>3</sup>	376	60	60	60	60	60	60	60
Private (industrial and non-industrial)	603	618	610	614	634	634	638	640
Other Public	62	62	64	64	64	64	64	64
Total	1,240	927	984	962	825	832	818	799
<b>Timber Harvest (2001 to 2010)<sup>2</sup></b>								
Total	1,240	1,068	1,124	1,102	959	964	947	928
<b>Timber Processed (1993 to 2000)<sup>24</sup></b>								
Total	1,294	1,115	1,170	1,148	1,008	1,014	997	979

<sup>1</sup> Totals do not include Klamath Falls Resource Area.<sup>2</sup> Data source: Non-BLM harvest projections from Timber Supply Analysis for BLM Planning, USDA-USFS, PNW Research Station, Portland, OR 1992 (revised 1994)<sup>3</sup> Assumes implementation of the Supplemental Environmental Impact Statement Record of Decision<sup>4</sup> Timber Processed from all sources was partitioned on county boundaries to approximate BLM Districts, with the exception of the coastal portion of Douglas County which was included in Coos Bay District. This analysis accounts for historic patterns of log flows across county boundaries. Assumes all BLM districts have implemented the same alternative. Includes logs exported overseas.

## Chapter 4 - Environmental Consequences

Allocations under all alternatives would also affect the cost of timber production. Highest production costs would result under Alternatives C and E. Lowest production costs would result under Alternatives No Action, A, and B.

With the exception of variation in rotation length, the alternatives do not have major effects on wood quality. Alternative C, because of low stand densities, could have a detrimental effect on wood quality if pruning were not used.

While all alternatives are designed to assure a high level of reforestation success, Alternatives A and B would result in an increase in reforestation and operational costs required for dry, low elevation sites.

The allocation of sites economically marginal for timber production had a very minor effect on probable sale quantity.

During the 1984 to 1988 baseline period, timber harvests from Klamath Falls Resource Area lands made up 3.5 percent of the Klamath County harvest. Compared to this baseline, timber harvest from BLM lands would increase slightly for Alternative No Action, and decrease under the other alternatives. The Proposed Resource Management Plan would result in a BLM timber supply that is approximately 33 percent of the BLM's timber supply during the baseline period.

## Effects on Exploration and Development of Energy and Mineral Resources

Future trends and assumptions, along with ten-year energy and mineral development scenarios for the planning area, are discussed in detail in Appendix N. It is assumed that the same level of exploration and development would occur through all of the alternatives. Generally, the same amount of land would be available, but the restrictions would vary considerably.

Locatable mineral exploration activity would remain low, and most likely would be for disseminated gold (a scattered distribution of generally fine-grained ore). Minor notice-of-operation-level (five acres or less) exploration drilling and sampling could occur. Although there is no record of placer gold in any of the drainages in the planning area, suction dredging could occur along some of the streams and rivers.

Exploration for other locatable minerals is expected to be insignificant.

Leasable minerals in the planning area include oil and gas and geothermal resources. Oil and gas exploration would be sporadic and would include minor geophysical work and the possibility of 1 or 2 wildcat wells (risky exploration) in an unproved area. Geothermal exploration is expected to increase, most likely in the high potential areas (see Map 3-14), and could include surface geophysical surveys, temperature gradient holes, up to three exploratory wells, possibly one 24-megawatt power plant, and/or some form of direct use (such as greenhouses, food processing, and aquaculture).

Salable mineral disposal is expected to remain at approximately the current level (average annual production of 80,000 cubic yards of rock and cinder), with minor increases in the disposal (collection) of decorative rock.

The high, moderate, and low/unknown mineral potential discussed in this document is the potential for the occurrence of specific minerals, and not necessarily the potential for exploration and/or development. The potential was derived by assessing the geologic environment, inferred geologic processes, known mineral occurrences, and past and present mineral exploration. Data from limited field mineral inventories conducted for various actions such as land exchanges and leases, as well as publications and maps from various sources were also used to determine the mineral potential. Table 4-41 shows the acreage of high, moderate, and low/unknown potential for locatable, leasable, and salable minerals on BLM-administered land in the planning area. The footnote to the table explains the acreage discrepancy between this table and Table 3-38.

The most favorable condition for exploration and development of mineral resources would be with as few restrictions as possible. Individuals and companies involved in exploration and development face numerous environmental obligations in order to comply with standard requirements and lease terms. Any additional measures for mitigation of disturbance to lands and nonmineral resources bring about greater effects on mineral exploration and development.

The allocations and management prescriptions of other resource programs affect availability of land for exploration and development of energy and mineral resources differently throughout the alternatives. The intensity of operating constraints or restrictions on locatable, leasable, and salable mineral activity would vary according to the location of the action and the

resource allocations and management prescriptions in each alternative. Restrictions on mineral exploration and development were divided into four or five categories: nondiscretionary closures (previously imposed by law, regulation, secretarial order, or executive order); discretionary closures (under the control of the BLM); open with standard requirements or lease terms; open with additional restrictions, such as seasonal constraints; and for leasable minerals only, open with no surface occupancy restrictions. The amount of land under each category was used to assess the effects on mineral activity (see Tables 4-42 through 4-45).

**Alternatives No Action and A.** Alternatives No Action and A provide the most land available, subject to standard requirements, for locatable and salable mineral activities.

**Alternatives A and B.** Alternatives A and B provide the most land available for oil and gas and geothermal activity subject to standard stipulations.

**Alternative C.** Alternative C is more restrictive to locatable, leasable, and salable mineral development primarily due to increased allocations of land for special management areas, special recreation management areas, off-highway vehicle closures, old growth restoration and retention blocks, riparian management areas, areas of critical environmental concern, and the upper Klamath River suitable recreational river area.

**Alternative D.** Alternative D is more restrictive than Alternatives No Action, A, B, and C primarily because of additional areas of critical environmental concern, off-highway vehicle closures, special management areas, special recreation management areas, and the upper Klamath River suitable scenic river area.

**Alternative E.** Alternative E is the most restrictive of all because it includes most of the restrictions imposed in Alternative D, as well as additional restrictions for old growth, riparian management areas, and six suitable scenic river areas.

**The Proposed Resource Management Plan.** The Proposed Resource Management Plan is similar to the other alternatives with respect to locatable minerals. The major differences occur with respect to leasable and salable minerals. Because of the special consideration given to special status/Supplemental Environmental Impact Statement special attention plant and animal species, none of the lands are open subject to standard requirements only. In addition, for oil and gas and geothermal leasing, more acres are subject to no surface occupancy as a result of the increase in acreage of Riparian Reserves.

## Summary

The amount of land *closed* to locatable and leasable mineral activity does not vary significantly among the alternatives. Alternatives D and E impose the most *restrictions* on locatable minerals. Alternatives D and E also close the most land to salable mineral disposal. The Proposed Resource Management Plan imposes the most restrictions on leasable and salable activities, primarily because of the requirements relating to special status and Supplemental Environmental Impact Statement special attention species. In addition, the Proposed Resource Management Plan subjects the most land to no surface occupancy stipulations. Most of the no surface occupancy is related to Riparian Reserves. In contrast, Alternatives No Action and A provide the most land available for locatable and salable mineral activity subject to standard requirements. Alternatives A and B provide

Table 4-41. Mineral Potential (acres)<sup>1</sup>.

	High	Moderate	Low/Unknown
Locatable Minerals	900	129,200	105,800
Leasable Minerals			
Oil and Gas	0	238,700	0
Geothermal	1,500	235,800	0
Salable Minerals	1,300	236,000	0

<sup>1</sup> Difference of acres between this table and Table 3-38 results from an anticipated increase in mineral acres associated with the relinquishment of U.S. Bureau of Reclamation withdrawals.

the most land available for oil and gas and geothermal activity subject to standard stipulations.

Compliance with applicable environmental laws and regulations could add costs and delays resulting in adverse effects on exploration and mining that cannot be avoided. The imposition of discretionary (BLM-controlled) mitigation measures generally adds more costs to mineral exploration and development, thereby increasing the adverse effects on these programs. In addition, seasonal restrictions could result in access times being too short for effective exploration and development. When considering the land and resource management objectives associated with Alternatives D and E, the cumulative effects of imposing the mitigating measures associated with objectives would hinder mineral exploration and, possibly, development. The alternatives that provide for the maximum acreage subject to standard requirements would be the least affecting. Removal of mineral commodities would be an irreversible or irretrievable commitment of resources.

## Effects on Socioeconomic Conditions

### Introduction

Each alternative analyzed in this Proposed Resource Management Plan/Final Environmental Impact Statement proposes varying management prescriptions that would alter the production of commodity outputs and other natural resource values associated with BLM-administered lands. Alternatives No Action and A through E have been carried forward from the Draft Resource Management Plan/Environmental Impact Statement and re-analyzed within the context of changed U.S. Forest Service management direction specified in the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* and decisions in the Supplemental Environmental Impact Statement Record of Decision. While the

Table 4-42. Locatable Mineral Availability by Alternative (Acres).

Restrictions/ Mineral Potential	Alternative						PRMP
	NA	A	B	C	D	E	
Closed Non-Discretionary							
High	0	0	0	0	0	0	0
Moderate	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Low/Unknown <sup>2</sup>	700	700	700	700	700	700	700
Closed Discretionary							
High	0	0	0	0	0	0	0
Moderate	0	0	0	0	0	0	600
Low/Unknown	100	100	100	100	100	100	100
Open: Standard Requirements							
High	500	600	600	400	400	400	400
Moderate	99,600	99,800	99,600	82,600	67,400	63,400	89,000
Low/Unknown	102,600	102,600	100,600	100,600	96,800	92,900	102,200
Open: Additional Restrictions							
High	400	300	300	500	500	500	500
Moderate	24,600	24,400	24,600	41,600	56,800	60,800	34,600
Low/Unknown	2,400	2,400	4,400	4,400	8,200	12,100	2,800

<sup>1</sup> Includes 900 acres that are closed to non-metaliferous mining only.

<sup>2</sup> Includes 600 acres that are closed to non-metaliferous mining only.



Table 4-43. Oil and Gas Availability by Alternative (Acres).

Restrictions/ Mineral Potential	Alternative						PRMP
	NA	A	B	C	D	E	
Closed Non-Discretionary							
High	0	0	0	0	0	0	0
Moderate	300	300	300	300	300	300	300
Low/Unknown	0	0	0	0	0	0	0
Closed Discretionary							
High	0	0	0	0	0	0	0
Moderate	0	0	0	0	0	0	0
Low/Unknown	0	0	0	0	0	0	0
Open: No Surface Occupancy							
High	0	0	0	0	0	0	0
Moderate	3,400	2,400	10,000	10,800	11,500	11,700	40,800
Low/Unknown	0	0	0	0	0	0	0
Open: Standard Lease Terms							
High	0	0	0	0	0	0	0
Moderate	164,600	175,200	175,800	126,800	117,600	100,200	0
Low/Unknown	0	0	0	0	0	0	0
Open: Additional Restrictions							
High	0	0	0	0	0	0	0
Moderate	70,400	60,800	52,600	100,800	109,300	126,500	197,600
Low/Unknown	0	0	0	0	0	0	0

Table 4-44. Geothermal Availability by Alternative (Acres).

Restrictions/ Mineral Potential	Alternative						PRMP
	NA	A	B	C	D	E	
Closed Non-Discretionary							
High	0	0	0	0	0	0	0
Moderate	300	300	300	300	300	300	300
Low/Unknown	0	0	0	0	0	0	0
Closed Discretionary							
High	0	0	0	0	0	0	0
Moderate	0	0	0	0	0	0	0
Low/Unknown	0	0	0	0	0	0	0
Open: No Surface Occupancy							
High	200	200	200	200	200	200	200
Moderate	3,200	2,200	9,800	10,600	11,300	11,500	40,600
Low/Unknown	0	0	0	0	0	0	0
Open: Standard Lease Terms							
High	500	1,300	1,300	200	200	200	0
Moderate	164,100	173,900	74,500	126,600	116,300	100,000	0
Low/Unknown	0	0	0	0	0	0	0
Open: Additional Restrictions							
High	800	0	0	1,100	1,100	1,100	1,300
Moderate	68,200	59,400	51,200	98,300	107,900	124,000	194,900
Low/Unknown	0	0	0	0	0	0	0

Table 4-45. Salable Mineral Availability by Alternative (Acres).

Restrictions/ Mineral Potential	Alternative						PRMP
	NA	A	B	C	D	E	
Closed Non-Discretionary							
High	0	0	0	0	0	0	0
Moderate	300	300	300	300	300	300	300
Low/Unknown	0	0	0	0	0	0	0
Closed Discretionary							
High	0	0	0	100	100	100	100
Moderate	3,100	6,700	15,600	16,700	17,300	32,000	14,500
Low/Unknown	0	0	0	0	0	0	0
Open: Standard Requirements							
High	300	900	800	100	100	100	0
Moderate	181,000	174,400	172,900	122,200	117,500	99,900	0
Low/Unknown	0	0	0	0	0	0	0
Open: Additional Restrictions							
High	1,000	400	500	1,100	1,100	1,100	1,200
Moderate	51,600	54,600	47,200	96,800	100,900	103,800	221,200
Low/Unknown	0	0	0	0	0	0	0

alternatives only represent actions which could occur on BLM-managed lands, many analytical components of the plan consider the relationship between BLM-administered lands and other federal, state and private landowners. In order to estimate what future actions are likely to occur on U.S. Forest Service lands, and in order to enhance the discussion of cumulative impacts, the economic analysis has drawn heavily upon the analyses conducted by the Forest Ecosystem Management Assessment Team in the Forest Ecosystem Management report and the Supplemental Environmental Impact Statement and decisions in the Supplemental Environmental Impact Statement Record of Decision.

No estimates have been made of the economic contributions to local personal income and employment that could be made by any potential developments such as mineral, energy, communication, hydroelectric, and fishing. The timing, duration and degree of such developments are speculative and cannot be estimated at reasonably accurate levels given current information.

## Impacts to Resource Uses

The availability of commodities, natural resources, and opportunities would be altered by each alternative.

Commodity uses generate measurable economic activity, both within and beyond the district. These activities include timber production and harvest, mining, recreation, special forest/natural products, livestock grazing, and fisheries production. See Appendix 4-G in the draft Resource Management Plan/Environmental Impact Statement for a complete economic analysis of grazing management in the planning area. The Proposed Resource Management Plan would be essentially the same as the drafts Preferred Alternative.

In addition to these activities, natural resources also have values that do not generate measurable economic activity within markets. These non-market values include: scenic areas, water quality, recreational use, nature study, cultural and subsistence hunting and gathering, and historic and prehistoric sites and resources. These values are demonstrated by people who express a desire for these resources or opportunities on public lands. These non-market values are to some extent reflected in changes in visitor use, but are not sufficiently quantifiable to be compared to other values in the socioeconomic analysis.

## Timber

Timber markets within the Northwest region have undergone significant changes since the 1984-1988 baseline period. Two forces particularly relevant to federal timber supply and stumpage price are: the curtailment of federal timber sales due to court injunctions, and the adoption of the Supplemental Environmental Impact Statement Record of Decision by the Secretaries of Agriculture and the Interior, and thus the U.S. Forest Service and the BLM. The curtailment of federal timber sales within the range of the Northern Spotted Owl resulted in forest industry reliance on sales remaining under contract for federal timber harvest since 1992. This volume is now essentially exhausted on the lands of both agencies.

The April 1994 Supplemental Environmental Impact Statement Record of Decision projected future timber harvest levels significantly lower than those identified in the U.S. Forest Service's Forest Plans and BLM's 1992 draft Resource Management Plan/Environmental Impact Statements in western Oregon. Any substantial change in timber supply could be expected to affect timber stumpage prices within the range of the Northern Spotted Owl. The size of changes in federal timber harvests considered in the Supplemental Environmental Impact Statement Record of Decision was much larger than the changes in BLM harvests analyzed in this Final Environmental Impact Statement/Proposed Resource Management Plan.

Future timber price projections were required in this Final Environmental Impact Statement/Proposed Resource Management Plan to conduct portions of the analysis relating to employment, income, and county revenues. This Final Environmental Impact Statement/Proposed Resource Management Plan assumes under all BLM alternatives that the Supplemental Environmental Impact Statement Record of Decision is implemented on all of the affected National Forests. The result is higher future stumpage price estimates than in the 1992 draft Resource Management Plan/Environmental Impact Statement. For a complete description of the price estimation process, consult the Klamath Falls Resource Area draft Resource Management Plan/Environmental Impact Statement Appendix 4-A.

Multiple factors have combined to cause significant price changes since the baseline period. In general, the price variation among alternatives is expected to be minimal. The most significant change was between the baseline period and the 1993-2000 period. Future variations in BLM timber harvest, when

examined alone, would have only marginal impacts on stumpage prices. Although price is one important market component that has changed, timber market structures are also undergoing change.

Alternatives C, D, E, and the Proposed Resource Management Plan, reduce BLM timber harvest below historic levels. Reductions in BLM harvests, combined with reductions in U.S. Forest Service harvest levels, would reduce federal timber supplies in the Pacific Northwest. Although increased harvest levels on private land (industrial and non-industrial) would mitigate a portion of this reduction, an overall reduction in Northwest timber supply is expected. Analyses using the CINTRAFOR Global Trade Model indicate that reduced timber supply in the Pacific Northwest would be offset by a combination of reduced demand for wood products and additional supplies from other areas in the United States and other wood-producing countries of the global economy (Perez-Garcia 1991). Increased use of substitute or recycled materials, including plastics, aluminum, steel, and cement, would result in reduced demand for wood products and are expected to gain wider use, particularly in residential construction.

Use of substitute building materials and alternative timber resources has raised concerns about their environmental impacts. Questions have also been raised about the incremental impacts of local, regional, and national environmental policy choices on the global economy and environment (Lippke 1991, Schallau and Goetzl 1992).

Issues of concern that have been studied include the increased use of fossil fuels, carbon dioxide emissions, environmental impacts of increased mining and quarrying, and supply of wood products from less productive or less efficient producers. Use of these and other materials, instead of wood products, for similar uses in residential construction required more energy (as measured in oil equivalent British Thermal Units) to produce and deliver (Koch 1991).

The rates at which reduced demand, substitute materials, and alternative supply sources would affect the wood products market are unknown. However, each replacement source can be expected to have associated economic and environmental impacts, often in other regions of the United States and the world.

## Forest Production Activities

The structure of the forestry services sector would likely change under the direction established in the

## Chapter 4 - Environmental Consequences

Supplemental Environmental Impact Statement Record of Decision as management emphasis shifts from timber production to ecosystem management. As fewer acres are subject to harvest, there would be a decrease in post-harvest reforestation, stand maintenance, and protection needs. Workers in these forest production activities, who are predominantly Hispanic, would likely have many of the skills needed to conduct the additional forest treatment, inventory, monitoring and restoration activities envisioned in the forest management field described in the Supplemental Environmental Impact Statement. It has been estimated that an additional 6,000 forestry services workers would be employed as a result of the Supplemental Environmental Impact Statement within the range of the Northern Spotted Owl (BLM and U.S. Forest Service 1994). Many of these forestry services jobs, however, are low paying and cannot replace the wages associated with higher paying jobs associated with logging and millwork (Richardson 1993).

### Recreation

Each alternative in the Klamath Falls Resource Area identifies management actions that would favor certain types of recreation, or constrain development of recreation sites or facilities. Alternatives No Action, A, and B would have unmet needs for non-motorized travel and other land-based uses, and Alternatives No Action and A also would not meet all the demand for winter snow sport opportunities (see the discussion of recreation demand in the Recreation section of Chapter 4). These unmet needs are primarily due to constraints these alternatives would place on the development of trails, picnic areas, campsites and other facilities. Finally, under Alternatives D, E, and possibly the Proposed Resource Management Plan, demands for off-road travel would not be met on BLM-managed lands. These constraints would change the amount of recreation-dependent personal income and employment attributable to BLM-managed lands in the Klamath Falls Resource Area. However, substitution of recreation opportunities associated with other ownerships and areas within the Pacific Northwest is expected to satisfy all demand for recreation activities.

### Special Forest/Natural Products

Demand for all special forest products would be met under Alternatives No Action, A, and B. (See discussion of special forest/natural product demand in the Special Forest/Natural Product section of Chapter 4.) Lower fuelwood sales under Alternatives C, D, E, and the Proposed Resource Management Plan would

result in lower federal permit receipts. There would be reduced self-sufficiency of some individuals who would be forced to purchase fuelwood from other sources at significant additional expense. Demand for all other identified special forest products is expected to be met under these alternatives.

Native Americans and non-native settlers have collected forest/natural products for personal use for many years. Commercial collection has expanded as more products are marketed. The competition between local collectors and collectors from outside the region can sometimes generate conflict (Richardson 1993). Recent Asian and Hispanic immigrants have been identified as specific cultural groups entering the region specifically to collect special forest/natural products. Anecdotal evidence suggest that unemployed wood products workers are also participating in commercial collection.

Permitted collection of special forest products would be encouraged under all alternatives and may enhance local economies.

### Impacts to Personal Income and Employment

The BLMFACT model was used to analyze the employment and income associated with the use of timber, provision of recreation, and forest management within the Klamath Falls Resource Area. Table 4-46 provides a summary of measurable outputs under each alternative in the Klamath Falls Resource Area. These quantities represent values associated with BLM management actions under each alternative and were used to estimate dependent personal income and employment. Table 4-47 displays the varying levels of income and employment by sector associated with each alternative. Display of these impacts was changed from the draft Resource Management Plan/Environmental Impact Statement in response to public comments. Impacts are now displayed by economic sector; employment and personal income associated with each resource commodity or activity are not shown. Non-market natural resource values were not included in the personal income and employment analyses.

Under all alternatives, reaching full implementation would take several years of increasing activities. This could prevent fully reaching the employment and income levels shown here for several years. The employment and income estimates for the Proposed Resource Management Plan do not include the effect of restoration activities or the processing of wood removed from reserves as part of density manage-

ment. In the Klamath Falls Resource Area 0.11 million cubic feet per year of timber might be removed from various reserves, providing additional wood supply income and employment.

## Cumulative Impacts to Personal Income and Employment

An analysis was conducted to examine the effect of BLM management in all western Oregon districts on the western Oregon region. The common alternatives and the proposed resource management plans from all six BLM districts in western Oregon were combined. The BLMPACT model was then used to estimate dependent personal income and employment. The analysis methodology paralleled that of the individual districts. It should be noted that, as a result of the economic interactions within the larger analysis area, the individual district results do not sum to the values calculated for western Oregon. Some areas have greater natural resource dependence with more direct effects, while other areas have greater economic diversity resulting in more indirect effects. Table 4-48 displays the results of the western Oregon cumulative analysis for the BLM alternatives.

The management of BLM's timber resource is only one component of a larger economy. The Supplemental Environmental Impact Statement examined the cumulative effects on timber industry employment of ten alternatives. The Supplemental Environmental Impact Statement Alternative 9, which was the basis for the Supplemental Environmental Impact Statement Record of Decision, is the focus of the following discussion.

The Supplemental Environmental Impact Statement analysis of cumulative effects was conducted using regional coefficients representing timber industry employment affected per million board feet of timber harvest. Timber industry employment was defined as Solid Wood Products plus Pulp and Paper. Self-employment, wage, and salary employment was included.

Within Oregon, subregional differences were identified. Employment in Solid Wood Products was similar for all regions except the Central region (Deschutes, Klamath, Lake, Jefferson, and Wasco counties). In the Central region, approximately 16 jobs per million board feet are affected. For the remaining subregions, approximately nine jobs per million board feet are affected. The Northwest region (Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah,

Table 4-46. Summary of Measurable Annual Outputs by Alternative in the Klamath Falls Resource Area.

	Base	NA	A	B	C	D	E	PRMP
Timber Harvest (mmcf)	3,42	3,693	2,75	2,352	1,017	1,922	0,186	1,106
Non-Resident Recreational Use <sup>1</sup>								
Fishing (Angler Days)	1,900	2,430	2,430	2,430	2,430	2,430	2,430	2,430
Hunting (Hunter Days)	1,800	2,050	2,050	2,050	2,050	2,050	2,050	2,050
Non-Consumptive (User Days)	13,600	16,760	16,760	17,920	18,620	16,070	16,070	18,620
Timber Management Activity (\$MM)	N/A	0,489	0,406	0,367	0,195	0,298	0,081	0,277
Livestock Grazing (AUMs)	13,869	13,869	16,894	14,140	12,503	11,483	9,649	12,978

<sup>1</sup> Hopedarsky, 1989. Pacific Northwest Outdoor Recreation Consumption Projection Study. Oregon Project Final Report. Ellensburg, Oregon: State Parks, Personal Communications. July 23, 1991, November 20, 1991, and December 10, 1991. No adjustments have been made to the projected demand figures to reflect the potential Wild and Scenic River designation for the upper Klamath River. The designation of the Klamath River as a Wild and Scenic River would have no significant effect on recreation.

AUMs = Annual unit months

\$MM = Million dollars

Abbreviations Used: mmcf = Million cubic feet



**Table 4-47. Estimated Annual Dependent Personal Income and Employment by Alternative in the Klamath Falls Resource Area.**

	Base	NA	A	B	C	D	E	PRMP
Personal Income (Million in 1989 Dollars)								
Timber Harvest								
Direct	2.730	2.593	1.916	1.623	0.610	1.293	0.140	0.602
Total	3.518	3.397	2.508	2.124	0.801	1.697	0.184	0.789
Non-Resident Recreation								
Direct	0.110	0.134	0.134	0.141	0.148	0.130	0.130	0.146
Total	0.180	0.219	0.219	0.230	0.238	0.212	0.212	0.238
Timber Management Activity								
Direct	N/A	0.150	0.130	0.120	0.060	0.090	0.030	0.090
Total	N/A	0.322	0.369	0.324	0.315	0.309	0.299	0.318
Livestock Grazing								
Direct	0.092	0.092	0.096	0.083	0.090	0.068	0.088	0.091
Total	0.322	0.322	0.369	0.324	0.315	0.309	0.299	0.318
Employment (Jobs)								
Timber Harvest	100	100	70	60	20	50	5	20
Total	170	170	130	110	40	90	10	40
Non-Resident Recreation								
Direct	10	10	15	15	15	15	15	15
Total	20	20	20	20	20	20	20	20
Timber Management Activity								
Direct	N/A	23	20	16	10	15	4	13
Total	N/A	36	31	26	15	22	5	21
Livestock Grazing								
Direct	14	14	15	14	14	13	13	14
Total	37	37	39	37	36	35	34	37

Source: U.S. Department of the Interior, BLM, Oregon State Office, May 1988. BLMPACT Software and Reference Manual. OR-952-CT9-2019. Prepared by ECO Northwest.

Polk, Tillamook, Washington, and Yamhill counties) was identified as having significant Pulp and Paper employment, 2.19 jobs per million board feet. The remaining subregions have limited Pulp and Paper employment per million board feet.

Overall, timber industry employment in western Oregon is projected to decline 23 percent from 1990 levels under the Supplemental Environmental Impact Statement Record of Decision. A 40 percent reduction from the 1990 timber industry employment level is projected for the Southwest subregion. A decline of 28 percent is projected for the West-Central subregion (Benton, Lane, Lincoln and Linn counties). The Northwest and Central regions are both projected to experience less than 10 percent reductions in timber industry employment from the 1990 level.

## **Impacts to County Revenues**

Future prices for timber stumpage in the Northwest are a key determinant of future revenue effects. Oregon and California payments to counties, severance taxes, and federal treasury receipts are all affected by the level of BLM timber harvest, with the price of timber determined by a competitive bid process. Northwest timber prices are expected to increase from the baseline period as supplies from federal lands decrease.

Table 4-49 displays the projected prices and harvest levels by alternative together with the estimated Oregon and California payments to each county. Prices under all alternatives are projected to increase significantly from the baseline period due to external factors beyond the scope of BLM's management alternatives (such as reduced harvest on National Forest lands within the spotted owl region). The analysis assumes all BLM districts would adopt the same alternative. Under Alternatives A and B, which increase harvest levels relative to those of the baseline period, county Oregon and California revenues would increase significantly over those of the baseline period. This is partly because external factors would cause timber prices to be higher than those of the baseline period. Under Alternatives C, D, E, and the Proposed Resource Management Plan, increased stumpage prices would not fully mitigate timber harvest reductions, thus reducing Oregon and California payments to counties below those during the baseline period. In recent years, legislation has provided for additional "safety net" payments to the counties. As an example, in Fiscal Year 1991, payment of 96 million dollars was guaranteed. This was 152 percent of the average payment during the baseline period. Current legislation specifies a

gradual ramping down of the guaranteed payment level from the 1986-1990 average payment. These "safety net" payments have mitigated a large portion of county revenue impacts of reduced BLM harvest under the recent court injunctions. Table 4-49 does not incorporate this legislation into the estimates displayed, as it is subject to Congressional revision.

Payments in Lieu of Taxes, made for a variety of federal lands within each county, are projected to remain unchanged under all alternatives. Potential changes in land tenure by the BLM and other federal agencies could alter the level of payment made to the county. County revenue impacts of specific exchanges or disposals are evaluated as they are proposed, and are not included in this document.

Approximately five percent of the revenues generated by public domain lands are dispersed through the state to counties proportionate to the land area within the county. Historically, timber harvest has been the dominant source of revenue from these lands. Based on estimated probable sale quantities, revenues of Alternatives A, B and No Action would increase. Under the other alternatives (C, D, E, and the Proposed Resource Management Plan, revenues would be reduced. The counties must use these revenues to build roads and bridges. Funding for these capital projects would be reduced by Alternatives C, D, E, and the Proposed Resource Management Plan. Opportunities exist in the future to increase revenue collections for use of public domain lands. For example, collections associated with special forest products permits and special recreation permits could increase if these programs expand.

Under all alternatives, except No Action, harvest volumes subject to state Forest Products Harvest Tax would decline from baseline levels. Given constant tax rates, revenues could be expected to decline under these alternatives. Decreases in revenues would negatively impact programs funded by this tax, such as forest research and fire prevention or suppression. The Oregon State Legislature sets the tax rate and in recent bienniums has significantly increased the tax rate, as well as a number of programs funded by the tax. In future sessions, the legislature could increase the tax rate to maintain constant revenue streams despite decreased harvest volumes.

## **Cumulative County Revenue Impacts**

After examining the impacts of reduced timber harvest on both BLM and U.S. Forest Service lands, the Supplemental Environmental Impact Statement

Table 4-48. Estimated Dependent Personal Income and Employment by Alternative, Western Oregon BLM.

	1984-1988		No Action		A	
	Direct	Total	Direct	Total	Direct	Total
Personal Income, Millions (1989 Dollars) Total	111.057	254.892	112.261	257.286	145.002	333.352
Farm	0.088	0.284	0.088	0.356	0.105	0.436
Non-Farm	110.969	252.980	112.173	255.202	144.896	330.702
Agricultural Services, Forestry, Fisheries, and Other.	0.010	5.191	6.538	11.515	8.230	14.767
Mining	0.000	0.017	0.000	0.017	0.000	0.022
Construction	0.000	3.575	0.000	3.499	0.000	4.555
Manufacturing	104.873	173.346	99.001	164.433	130.380	216.310
Nondurable Goods	0.294	4.861	0.325	5.259	0.309	6.563
Paper & Allied Products	0.000	0.566	0.000	0.620	0.000	0.783
Durable Goods	104.579	168.485	98.675	159.173	130.072	209.746
Lumber & Wood Products	104.579	165.154	98.675	155.855	130.072	205.439
Transportation & Public Utilities	0.622	12.587	0.681	12.971	0.646	16.486
Wholesale Trade	0.127	0.771	0.139	0.807	0.132	0.977
Retail Trade	1.665	9.742	1.819	10.544	1.726	12.926
Finance, Insurance, & Real Estate	0.000	11.073	0.000	11.843	0.000	15.202
Services	3.672	36.678	3.996	39.573	3.783	49.458
Government	0.000	1.628	0.000	1.729	0.000	2.214
Federal, Civilian	0.000	1.183	0.000	1.259	0.000	1.610
State and Local	0.000	0.445	0.000	0.470	0.000	0.604
Employment (Jobs) Total	5,299	12,204	6,107	13,236	7,760	16,982
Farm	15	58	15	72	17	89
Non-Farm	5,285	12,068	6,093	13,081	7,742	16,788
Agricultural Services, Forestry, Fisheries, and Other.	0	756	1,024	1,751	1,289	2,245
Mining	0	1	0	1	0	1
Construction	0	132	0	130	0	169
Manufacturing	4,734	6,574	4,469	6,247	5,885	8,213
Nondurable Goods	15	224	16	247	15	307
Paper & Allied Products	0	24	0	26	0	32
Durable Goods	4,719	6,350	4,453	6,000	5,869	7,906
Lumber & Wood Products	4,719	6,186	4,453	5,838	5,869	7,695
Transportation & Public Utilities	23	463	26	477	24	606
Wholesale Trade	5	145	6	146	5	188
Retail Trade	132	753	144	815	137	997
Finance, Insurance, & Real Estate	0	601	0	646	0	828
Services	391	2,643	425	2,871	402	3,541
Government	0	78	0	83	0	106
Federal, Civilian	0	44	0	47	0	60
State and Local	0	34	0	36	0	47

Source: U.S. Department of Interior, BLM 1989b

B		C		D		E		Proposed Resource Management Plan	
Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
131.645	302.220	47.819	107.514	51.501	115.954	39.842	88.756	29.974	65.915
0.091	0.394	0.084	0.249	0.079	0.241	0.069	0.200	0.088	0.214
131.555	299.811	47.435	106.471	51.422	114.874	39.773	87.901	29.887	65.179
7.410	13.306	4.665	6.509	3.935	5.976	2.316	3.825	2.814	3.824
0.000	0.020	0.000	0.007	0.000	0.008	0.000	0.006	0.000	0.005
0.000	4.123	0.000	1.395	0.000	1.525	0.000	1.162	0.000	0.830
117.517	195.043	35.538	59.720	39.734	66.569	29.295	49.217	18.936	32.207
0.323	6.041	0.365	2.785	0.375	2.912	0.392	2.425	0.392	2.073
0.000	0.717	0.000	0.311	0.000	0.325	0.000	0.262	0.000	0.220
117.193	189.003	35.174	56.935	39.359	63.658	28.903	46.792	18.544	30.134
117.193	185.100	35.174	55.574	39.359	62.182	28.903	45.664	18.544	29.309
0.679	15.068	0.770	6.126	0.792	6.522	0.832	5.271	0.830	4.233
0.139	0.913	0.157	0.483	0.162	0.507	0.170	0.453	0.170	0.401
1.816	11.999	2.057	6.046	2.116	6.310	2.224	5.458	2.218	4.791
0.000	13.822	0.000	5.398	0.000	5.690	0.000	4.403	0.000	3.496
3.994	45.518	4.548	20.786	4.683	21.766	4.936	18.107	4.919	15.392
0.000	2.015	0.000	0.794	0.000	0.839	0.000	0.656	0.000	0.522
0.000	1.466	0.000	0.583	0.000	0.616	0.000	0.483	0.000	0.387
0.000	0.549	0.000	0.211	0.000	0.223	0.000	0.172	0.000	0.135
7,080	15,442	3,031	6,078	3,126	6,382	2,437	4,920	2,048	3,930
15	81	14	50	13	48	12	40	15	42
7,065	15,265	3,017	5,991	3,112	6,294	2,425	4,849	2,033	3,863
1,161	2,022	730	998	616	913	362	580	440	586
0	1	0	0	0	0	0	0	0	0
0	153	0	52	0	56	0	43	0	31
5,304	7,407	1,605	2,280	1,795	2,539	1,324	1,880	856	1,237
16	283	18	133	19	138	19	115	19	100
0	30	0	13	0	13	0	11	0	9
5,288	7,124	1,587	2,147	1,776	2,401	1,304	1,765	837	1,137
5,288	6,934	1,587	2,082	1,776	2,329	1,304	1,711	837	1,098
25	554	29	225	30	240	31	194	31	155
6	171	6	64	6	69	7	54	7	42
144	926	163	469	168	490	176	425	176	373
0	753	0	296	0	312	0	242	0	193
425	3,279	484	1,606	499	1,676	526	1,432	524	1,247
0	97	0	38	0	40	0	31	0	25
0	54	0	22	0	23	0	18	0	14
0	43	0	16	0	17	0	13	0	10

concluded that anticipated timber price increases would not fully offset the revenue declines to the federal and local governments from implementation of the Supplemental Environmental Impact Statement alternatives. Like the analysis displayed in Table 4-49, the historical distribution formula of Oregon and California payments was used. The current congressional safety net was not included.

Several state and county issues would make it difficult for counties to replace federal timber revenues. Among the issues are passage of Ballot Measure 5 Property Tax Limitation and a general anti-tax sentiment among voters as demonstrated by the defeat of several sales tax initiatives. Interviewed individuals and county officials in rural counties expressed concern about this decreasing tax base (Richardson 1993).

### Impacts to Community Structure and Attributes

Recent discussions of community stability by natural resource sociologists have identified three broad definitions for human communities: a geographic area; local social systems; and types of relationships. Examples of these communities include town, county or state boundaries, commuting area, or relationships such as occupation or religious affiliation.

Community stability is an often stated desire of all types of communities. Stability is a misnomer, however, since communities are in a constant state of transition, and the status quo is rarely maintained. Attributes of prosperity, adaptability, cohesiveness, and ability to absorb and cope with change have been identified as desirable by some definitions of community stability (Society of American Foresters 1989). These definitions recognize change and seek orderly change as a desired goal.

Many geographic, social, or relational factors affect the above-listed desired attributes of any community. These factors include economic diversity, economic stability, population stability, social cohesion or community solidarity, structural diversity, location, quality of life, human capital, size, and local leadership (BLM and U.S. Forest Service 1994). In the Pacific Northwest, timber or forest dependence has been identified as a destabilizing factor due to recent changes in forest management (BLM and U.S. Forest Service 1994).

The Forest Ecosystem Management Assessment Team report and the Supplemental Environmental Impact Statement identify attributes of communities

likely to experience economic and social impacts which would disrupt existing community structures and trends. Communities with these attributes were labeled "most at risk". Specifically, the Supplemental Environmental Impact Statement text (page 2-82) states:

The "most at risk" communities differ from others in significant ways. These communities are smaller (average population 3,000), and they are located in counties with low population density. Isolated communities are more likely to experience negative consequences... because they have fewer employment options available locally or in nearby communities, and because of limited access to capital, transportation links, and other resources. Communities that are small, isolated, and lacking in economic diversity are more likely to be "at risk" than others. These communities may find it difficult to mobilize and respond to changing conditions that may affect a variety of groups. These communities are likely to experience unemployment, increased poverty, and social disruption in the absence of assistance.

In response to concerns about the adequacy of the socioeconomic analyses in the draft Resource Management Plan/Environmental Impact Statements for western Oregon, a study of the socioeconomic effects of resource management plans in western Oregon was commissioned. Catherine Woods Richardson, of the Institute for Resources in Society at the University of Washington, prepared a report designed to provide an analysis of the socioeconomic conditions affected by BLM management in western Oregon. The report set out to find out who is affected by agency actions and how they are affected. Richardson obtained information through interviews with BLM employees and several people in each district who were familiar with the BLM and the area. These individuals were selected by district employees, and often had worked with the BLM citizen advisory council in the district. They included local bank officers; tribal representatives; city, county and state officials; social service and development administrators; timber interests; and environmental professionals; among others.

The following discussion of the socioeconomic effects of BLM management within the district includes information from a variety of sources but relies heavily on the research done by Richardson.

Persons interviewed in Klamath County noted the hardships associated with job losses in the lumber and wood products industry and at Kingsley Field



**Table 4-49. Projected Annual Oregon and California Payments to Counties Attributable to Timber Harvest in Western Oregon (thousands of constant dollars)<sup>3</sup>**

	1984-1988 Average	NA	A	B	C	D	E	PRMP
Benton	\$ 1,770	\$ 3,652	\$ 4,761	\$ 4,333	\$ 1,352	\$ 1,521	\$ 1,115	\$ 724
Clackamas	3,478	7,213	9,403	8,558	2,670	3,005	2,203	1,430
Columbia	1,302	2,677	3,490	3,176	991	1,115	818	531
Coos	4,148	7,668	9,996	9,097	2,838	3,195	2,342	1,520
Curry	2,290	4,743	6,184	5,628	1,756	1,976	1,449	941
Douglas	15,850	32,555	42,439	38,625	12,051	13,563	9,943	6,456
Jackson	9,828	20,364	26,548	24,162	7,538	8,485	6,220	4,038
Josephine	7,579	15,699	20,466	18,626	5,811	6,541	4,795	3,113
Klamath	1,464	3,041	3,964	3,608	1,126	1,267	929	603
Lane	9,627	19,845	25,870	23,545	7,346	8,268	6,061	3,935
Lincoln	234	468	610	555	173	195	143	93
Linn	1,669	3,431	4,473	4,071	1,270	1,429	1,048	680
Marion	919	1,897	2,474	2,251	702	791	580	376
Multnomah	685	1,417	1,847	1,681	524	590	433	281
Polk	1,359	2,807	3,659	3,331	1,039	1,170	857	557
Tillamook	355	728	949	863	269	303	222	144
Washington	398	819	1,067	971	303	341	250	162
Yamhill	460	936	1,220	1,110	346	390	286	186
Total <sup>2</sup>	\$63,415	\$129,958	\$169,418	\$154,190	\$48,107	\$54,145	\$39,693	\$25,771
Assumed Price <sup>1</sup>	\$707	\$1,608	\$1,576	\$1,589	\$1,674	\$1,667	\$1,680	\$1,692
Total Volume (MMCF)		191	251	227	68	76	56	36
O&C Volume (MMCF)		162	215	194	57	65	47	30

<sup>1</sup> Prices estimated based on index of 1982 constant dollars

<sup>2</sup> Numbers may not add up due to rounding

<sup>3</sup> Projections do not include legislative "Safety Net" payments.

during the 1980s and early 1990s. Because few employment alternatives remained in the area, many men left their families to look for work elsewhere. Social service and law enforcement demands were thought to have increased among remaining residents, which overwhelmed counselors, police, and pastors (Richardson 1993). In 1990-1991, Klamath County health service providers predicted that declining federal forest revenues would force curtailment or termination of preventive programs; drug, alcohol, and sex education; and counseling. Law enforcement was also expected to face cutbacks (Lee et al. 1991). Cutbacks in law enforcement were confirmed in 1993 by Richardson.

In interviews, people expressed hope that the worst of the area's job losses and economic troubles were behind them, and that community spirit had improved in the past few years as retirees and some new industries and businesses had moved into the area (Richardson 1993).

Klamath County and the City of Klamath Falls are very concerned about future revenue streams. Significant threats identified are Ballot Measure 5, local economic hardship, a diminishing tax base, and reductions in federal timber receipts. Frustrated officials think that federal land management agencies are paying inadequate attention to the needs of distressed local communities. As a result of this concern, one resolution (Klamath County Land and Water Management Plan) and two ordinances were passed to outline the rights of the county and private citizens threatened by federal agencies (Richardson 1993).

## Energy, Minerals, and Geothermal

Socioeconomic impacts associated with the construction and operation of a 24 megawatt geothermal power plant could be significant. Before such a power plant would be authorized, an environmental impact statement that included an analysis of these impacts would be prepared. An Oregon Department of Energy paper, *Economic Impacts of Geothermal Power Development in Malheur County, Oregon* (Sifford & Beale 1993), discusses the incremental development of the construction and operation of a hypothetical 100 megawatt geothermal power project. Direct, indirect, and induced changes in the local economy, such as labor, infrastructure, capital requirements, operating revenues, local payroll, and royalty and tax payments are discussed. Indirect and induced royalty and tax payments are discussed.

Indirect and induced economic impacts associated with payments made to local governments and employees are estimated, and comparisons with other industries in the area are made. See Appendix N for an economic analysis of the Salt Calves Project.

## Effects on Rural Interface Areas

Resource management activities such as road construction, timber harvest, livestock grazing, mineral exploration and development, and modification of existing vegetation for wildlife and fuel hazard reductions (prescribed burning) could affect neighbors living in rural interface areas. In turn, the reaction of neighbors to these activities can create opportunity costs (for example, decisions to either defer or abandon timber harvest or prescribed burning in a specific area) or additional costs for BLM management in rural interface areas. In some situations, the number of neighbors and the number of resource management activities are directly proportional to the number of conflicts and additional costs to BLM.

Rural interface areas in the planning area have been analyzed for potential conflicts with neighbors. Timber harvest, other timber management activities such as tree planting and prescribed burning, and livestock grazing are considered short-term activities, with few long-term effects, whereas quarry development and vegetation manipulation could have both short- and long-term effects.

Effects on residents of rural interface areas would be primarily the result of inadequate or ineffective communication between the BLM and its rural neighbors, which could result in unresolved conflicts over how BLM-administered lands and resources should be used or managed. By establishing a formal program to insure effective communication, a cooperative attitude toward mutual problem solving could be established between the BLM and its neighbors. However, it would be unreasonable to believe all conflicts could be resolved and that some long-term disagreements and conflicts could not occur. Each alternative proposes varying levels of prescribed burning, timber harvest, and land disposal activities. These programs are anticipated (by the BLM) to be the most controversial programs and create concerns and conflicts between the BLM and the rural interface residents.

Rock quarry and locatable mineral exploration and development could produce, even with reclamation, irreversible effects from surface-disturbing activities.

**Alternative No Action.** There would be no special timber management actions or mitigation measures applied to these areas. Effect would be similar to Alternative A due to the lack of consideration given to adjacent land owners even though the timber harvest level would be slightly lower than that of Alternative C. The effects of livestock grazing would continue the current situation: some minimal grazing related reductions in screening cover and soil holding grasses, and occasional noise and odor problems associated with livestock proximity to private dwellings.

**Alternative A.** No special timber management actions or mitigation measures would be required in rural interface areas. Timber harvest could substantially change the visual landscape observed by local residents. The change to a less dense timber stand, combined with the creation of log landings and skid trails would probably be perceived negatively by rural interface area residents. Detrimental livestock grazing effects would increase due to the 24 percent increase in livestock use over current levels. High grazing use impacts include reduction of screening vegetation, removal of soil holding grasses, and possible noise and odor.

On BLM-maintained roads, dust abatement methods (such as watering and magnesium chloride) would reduce dust produced by road construction and timber hauling, but the amount would still be more than that produced by residential traffic. Privately-maintained public roads could be damaged because the BLM would be unable to maintain them during harvesting and hauling operations. The damage would remain until the private parties could repair them. Traffic noise could be more noticeable from the increased truck and automobile traffic volume during and after timber harvest until screening vegetation could regrow.

If used, herbicide spray could drift on to adjacent property. Refer to the *Western Oregon Program, Management of Competing Vegetation*, Final Environmental Impact Statement and the Final Environmental Impact Statement for *Vegetation Treatment of BLM Lands* for a discussion on effects of herbicide drift.

Underburning of logging residue would generate large volumes of smoke which would adversely affect local air quality in the short term. Short-term increases in noise, dust, and vehicle traffic could also result from potential mineral exploration and development. Long-term visual effects could result from rock quarry

development or if a timber stand had to be clearcut to stop spreading disease or insects. Re-establishment of park-like timber stands would not be completed during the life of the plan. The potential for conflicts from these effects would be high in both the 1- to 5-acre and 6- to 20-acre rural interface area categories.

**Alternative B.** Special timber harvest mitigation measures would be used within 1/4 mile of 1- to 5-acre zoned areas. Increased dust and unabated noise, and reductions in visual screening would still occur. Effects from mineral exploration and development would be similar to Alternative A. Effects from livestock grazing would be similar to the Alternative No Action, although slightly higher due to the three percent increase in livestock use. Privately-maintained public roads could be damaged because the BLM would be unable to maintain them during timber harvesting and hauling operations. The damage would remain until the private parties could repair them. If used, hand application of herbicides to noxious weeds would minimize but not eliminate spray drift. Logging slash would be hand piled and burned, producing less smoke than Alternative A. Long-term visual effects could occur if a timber stand had to be clearcut to stop spreading disease or insects. Re-establishment of park-like timber stands would not be completed during the life of the plan. The potential for conflicts from these effects would be moderate in the 1- to 5-acre rural interface area categories and moderate to high in the 6- to 20-acre categories.

**Alternative C.** Timber harvest mitigation measures would be used within 1/4 mile of 1- to 20-acre zoned areas. Management of the timber resource would meet Visual Resources Management Class III objectives (see the Visual Resources section in Management Direction Common to Alternatives A through E and the Proposed Resource Management Plan in Chapter 2), which would reduce but not eliminate the visual effects from timber harvest. Increased dust and unabated noise, and reductions in visual screening would still occur. Effects from mineral exploration and development would be similar to Alternative A. Effects from livestock grazing would be similar to the Alternative No Action, although slightly less due to the eight percent decrease in livestock use. If used, hand application of herbicides to noxious weeds would minimize but not eliminate spray drift. Logging slash would be hand piled and burned producing less smoke than Alternative B. Long-term visual effects could occur if a timber stand had to be clearcut to stop spreading disease or insects. Re-establishment of park-like timber stands would not be completed during the life of the plan. The potential for conflicts would be moderate in the

## Chapter 4 - Environmental Consequences

1- to 5-acre rural interface area categories and low to moderate in the 6- to 20-acre categories.

**Alternative D.** Special timber harvest constraints would be used within ¼ mile of 1- to 20-acre zoned areas. Management of the timber resource would meet Visual Resource Management Class II objectives (see Chapter 2), which would make visual effects from timber harvest inconspicuous. Effects from mineral exploration and development would be similar to Alternative A. Effects from livestock grazing would be noticeably diminished, as compared to Alternative No Action, due to an overall decrease of 16 percent in grazing levels. There would be no herbicide or pesticide spraying or clearcutting. Noxious weeds and competing vegetation would be controlled or removed by hand, increasing the possibility that noxious weeds could become established on nearby private land. Fuel hazards would be removed or reduced by methods other than prescribed burning. Accumulations of fuels, pine needles, duff, leaves, and limbs would increase the possibility of wildfires and increase their rate of spread from public lands to adjacent private lands. Depending on the fuel type private lands could be involved before fire suppression forces could be mobilized. The potential for conflicts would be low in both the 1- to 5-acre and 6- to 20-acre rural interface area categories.

**Alternative E.** Under Alternative E, no timber would be sold within ¼ mile of rural interface areas with lots of 1- to 20-acres, consequently, potential conflicts in all rural interface area categories would be low. There would be no burning or herbicide spraying. Effects from livestock grazing would be noticeably diminished, as compared to Alternative No Action, due to an overall decrease of 29 percent in grazing levels. Short-term increases in noise, dust, and vehicle traffic could result from potential mineral exploration and development. Long term visual effects could result from rock quarry development, although without timber harvest the need for road material would be reduced. Risk of wildfire occurrence would be the same as Alternative D, with the potential for wildfire increasing in severity and rate of spread as hazard fuels accumulate.

### The Proposed Resource Management Plan.

Special timber harvest prescriptions or other resource mitigation measures could be used within ¼ mile of 1- to 20-acre zoned areas to mitigate adjacent landowner concerns. If used, hand application of herbicides on noxious weeds would minimize but not eliminate spray drift. Effects from mineral exploration and development would be similar to Alternative A.

Effects from livestock grazing would be similar to the Alternative No Action, although somewhat less due to the five percent decrease in livestock use. Logging slash could be hand piled and burned, chipped, or some other fuel reduction method could be used depending upon the concerns of adjacent landowners. Prescribed burning of public lands could occur. The goals of the prescribed burning program would include, but not be limited to, reducing fuel hazards and reducing the likelihood of a fire starting and spreading on to private lands. Excluding prescribed burning in rural interface areas would allow fire fuel levels to increase from their current high levels (see Effects on Wildfire section). Present fuel levels on public and private lands in the Klamath Forest Estates rural residential area make controlling a wildfire, before homes or building are burned, almost impossible. Excluding prescribed burning would allow this condition and the resulting risk of private property destruction to continue. Management of the timber resource would meet Visual Resource Management Class III objectives, which would reduce but not eliminate the visual effects from timber harvest. Increased dust and unabated noise, and reductions in visual screening could still occur. Long-term visual effects could occur if a timber stand had to be clearcut to stop spreading disease or insects. Re-establishment of park-like timber stands would not be completed during the life of the plan. The potential for conflicts is moderate to high in both the 1 to 5 and 6 to 20 acre categories.

## Summary

Alternatives No Action and A would not allow for management actions to be modified to address adjacent landowner concerns. Effects to adjacent landowners from noise, dust, and changes in scenery would be the most severe under these alternatives. Alternative B would allow management actions occurring within ¼ mile of rural interface areas with 1- to 5-acre parcels to be modified to reduce the effects on adjacent landowners. Alternatives C and D are similar in that they would allow management actions occurring within ¼ mile of rural interface areas with 1- to 20-acre parcels to be modified to reduce the effects on adjacent landowners. Visual effects of management actions would be more noticeable under Alternative C than Alternative D. Alternative E would allow management actions occurring within ½ mile of rural interface areas with 1- to 20-acre parcels to be modified to reduce the effects on adjacent landowners. This alternative also would prohibit, within ½ mile of rural interface areas, prescribed burning, timber harvests on site V (see Glossary) timber lands, and herbicide spraying.



The Proposed Resource Management Plan would allow special timber harvest or other resource mitigation measures to be used within ¼ mile of 1- to 20-acre rural interface areas to address adjacent landowner concerns. There would be no management practices specifically prohibited but each action would require input from adjacent landowners, consulted prior to implementation of any proposed action. Differences of opinion on the best way to manage public resources would still occur and some long-term disagreements and conflicts could develop. Effects from unpleasant odors, noise, and dust, as well as effects on the scenery would still occur; however, the severity of these effects could be lessened by directly involving the residents of the rural interface areas in the planning process (for example, such as watershed analysis and subsequent National Environmental Policy Act decisions).

## Effects on Livestock Grazing

Effects on livestock grazing would result primarily from changes in the amount of forage available and allocated to livestock grazing, changes in season of use, and the exclusion of areas from grazing due to other resource priorities.

This section outlines the environmental effects anticipated on the grazing management program for each of the alternatives. For Proposed Resource Management Plan allotment specific information, such as season of use, range improvement projects, and grazing preference levels see Appendix L. Table 4-50 summarizes the changes in the total animal unit months available in the planning area for the Proposed Resource Management Plan and each draft Resource Management Plan alternative.

Management actions that exclude portions of the currently available range from livestock grazing would have a negative effect that would be roughly proportional to the amount of land excluded. However, the

exclusion of livestock from areas that, in the past, were primary sources of water, could disproportionately affect grazing by making extensive upland areas non-available due to lack of water, if alternative water sources are not developed. Alternatives No Action, A, and B would have the least restrictions on livestock access, whereas the Proposed Resource Management Plan and Alternatives C, D, and E would have the most restrictions, primarily from increased riparian protection (Final Supplemental Environmental Impact Statement Aquatic Conservation Strategy), increased recreational constraints, protection of special status and special attention species, protection of sensitive cultural sites, and designation of wildlife use areas. It is possible that grazing use, under the Proposed Resource Management Plan, could be sharply curtailed or even eliminated on some allotments in order to meet the Supplemental Environmental Impact Statement Record of Decision required restrictions due to the Aquatic Conservation Strategy, Late-Successional/District Designated Reserves, and the standard and guideline designed to protect mollusks.

Vegetation manipulation or other management actions that increase the amount of available livestock forage and enhance range land conditions would have a positive effect on livestock grazing. Prescribed burning would have a positive effect on forage by rejuvenating and enhancing the vigor of most major grass and browse species. Alternatives No Action, A, and B would increase the available forage and improve livestock distribution through higher levels of timber harvest and associated understory burning and seeding as well as through juniper removals. Juniper removals would also provide for increased capture, storage, and release of water, which would benefit riparian and entire watershed values and provide for livestock water. These actions would open up the forest canopy, allowing palatable grasses and browse species to increase in the short term as compared to the Proposed Resource Management Plan and Alternatives C, D, and E which would favor greater forest cover. Long-term effects would be negative since many of the silvicultural

**Table 4-50. Change in AUMs by Alternative.**

	NA	A	B	C	D	E	PRMP
Total AUMs	13,662	16,894	14,140	12,503	11,463	9,649	12,978
Net Change	0	+3,232	+478	-1,159	-2,199	-4,013	-684
% Change	0	+24	+3	-8	-16	-29	-5



treatments in the Proposed Resource Management Plan and Alternatives C, D, and E would result in closed canopies with less available understory grasses and other forage species.

Range improvement projects, such as fencing and water developments, would facilitate better distribution of livestock and allow for more even utilization of the range lands, as well as opening up new areas to grazing use. The Proposed Resource Management Plan range improvements are listed in Appendix L, (Allotment Management Summaries). In general, the more range improvements that are implemented, the better the livestock management would be. With increased range improvements comes a better opportunity for the establishment of enhanced grazing systems with corresponding positive effects on livestock and range land ecological conditions. Implementation of grazing systems may also mitigate the need for reductions in livestock use due to enhanced forage quality and quantity.

Most of the changes to the seasons of use for livestock would have a positive effect on wildlife use due to increased forage available after livestock grazing and less spatial overlap and competition. Conversely, different and/or narrower seasons of use could be a negative impact to some livestock operators depending on their ability to compensate with other forage or pasture sources. Alternatives No Action, A, and B would provide greater amounts of forage available to livestock, whereas the Proposed Resource Management Plan and Alternatives C, D, and E could have a negative effect on livestock by providing less forage and constricted seasons of use.

With the emphasis on enhancement and protection of riparian and wetland areas, maximum utilization levels and other restrictive objectives would be established on an individual allotment basis to ensure the meeting of various riparian related requirements including the Aquatic Conservation Strategy. If livestock congregate in riparian and wetland areas and achieve the maximum utilization levels, the livestock could be moved prior to achieving full utilization on adjacent upland communities. This would cause a slight to moderate negative effect on the grazing operator and would affect the overall use of the forage base for the allotment.

Minor negative effects on livestock grazing could result from wild and scenic river, area of critical environmental concern, and other potentially restrictive designations. These designations could apply specific management constraints to livestock grazing in certain areas, including exclusion fencing. Alternatives No Action, A, and B would have the least effects

on livestock grazing from special designations because they would be few; while the Proposed Resource Management Plan and Alternatives C, D, and E would have the greatest effects due to more special designations. Construction of new roads and trails (proposed for other resources) that would eliminate small areas of forage could have a negative effect on forage available to livestock proportional to the size of the area eliminated. The Proposed Resource Management Plan and Alternatives No Action, A, B, C, and D would have the most negative effects from more roads, while Alternative E would have the least effects.

## Summary

**Alternative No Action.** Effects on livestock grazing, positive or negative, would be the least under this alternative because grazing levels would remain at current levels. Other management actions would continue to have the same positive and negative effects that the current livestock grazing program experiences. The long-term productivity and condition of the range lands could be negatively effected in some areas by continued short-term overuse.

**Alternative A.** This alternative would have the highest level of livestock grazing use and would be positively affected by increased timber harvest, which would increase forage production potential. However, the long-term productivity of the range lands could be negatively effected in many areas by the relatively high short-term use levels.

**Alternative B.** This alternative closely mirrors Alternative No Action, but with a slight, and thus positive increase in livestock grazing. An increased emphasis on riparian zone and wetland area protection could have a minor negative effect on the available livestock forage base; while the relatively high timber harvest level could have a positive effect by enhancing forage levels. The long-term productivity of the range lands in some areas could be somewhat negatively effected by the slightly higher use levels.

**Alternative C.** With moderately increased emphasis on protection of riparian zones, wetland areas, and special designation areas, as well as a relatively low level of timber harvest, available forage levels would be reduced moderately. This would have a minor effect on livestock grazing levels which could be recovered in the future due to ecological improvements resulting from enhanced management practices.

**Alternative D.** With increased emphasis on exclusion from grazing and protection of special or critical

wildlife habitats, riparian zones, wetland areas, and special designation areas, negative effects on livestock grazing levels would be more pronounced. The reductions proposed under this alternative are large enough that even with enhanced grazing management it is unlikely that the losses would ever be fully recovered.

**Alternative E.** This alternative would have the largest negative effect on livestock grazing levels due to the maximum protection and/or exclusions proposed for most other resources. Timber harvests would also be minimal, possibly reducing forage production. The reductions proposed under this alternative are large enough that even with enhanced grazing management it is unlikely that the losses would ever be fully recovered.

**The Proposed Resource Management Plan.** This alternative closely reflects Alternative C, in regard to livestock grazing, with added emphasis incorporated from the Supplemental Environmental Impact Statement Record of Decision on protection of riparian and wetland areas via the Aquatic Conservation Strategy, restrictions of Late-Successional/District Designated Reserves and other special designation areas, and the standard and guideline designed to protect mollusks. Overall, there would be a short-term negative effect on livestock grazing levels. However, through the use of range land improvement projects and proper grazing systems that meet the physiological requirements of important plant species, with commensurate ecological condition improvements, these reductions could be regained in the long term. Range land monitoring studies would continue to be established and data collected with allotments periodically evaluated on a priority basis. These evaluations could result in subsequent adjustments in grazing management and to grazing use, both positively and negatively.

Any Proposed Resource Management Plan action that permanently excludes livestock grazing could result in irreversible and irretrievable adverse effects on the available forage base. Such areas could include recreation sites, riparian and wetland areas, wildlife enclosures, sensitive species protection areas, and other special management areas. Riparian and wetland communities that need complete protection would be analyzed on a case-by-case basis for desired management results. This could limit the available forage base in these areas and eliminate livestock grazing as a vegetative manipulation tool.

## Effects on Wild Horses

The Pokegama Wild Horse Herd Management Area is located in a small portion of the planning area (west of Highway 97 and south of Highway 66); therefore, the only management activities expected to effect the horse herd would be those activities occurring in that area. Since the herd management area is located in primarily forested lands, the effects of forest management and silvicultural practices, along with livestock management, would have higher potential impacts to the wild horse herd than most other management actions.

Intensive timber management activities could have a short-term benefit by creating a more open timber stand and thereby allowing for a potential increase of grass and browse forage species in the understory. Long-term effects, however, would be negative since many of the silvicultural treatments would result in closed canopies with less available understory grasses and browse. If harvest of timber stands were on short rotations, the thermal cover provided by these stands would be minimal and restrictions to horse movements would be minor. Additional thermal cover would be available with longer rotations.

Other silvicultural activities, such as vegetation control and pre-commercial thinning, could cause negative effects under all alternatives. Vegetation control and pre-commercial thinning would reduce available forage by accelerating the movement of the vegetative community towards the later seral stages in which understory forage species abundance would be reduced. The slash from pre-commercial thinning and debris left after logging could create movement barriers. If wood chip or biomass sales were used, then movement barriers would be reduced.

Prescribed burning would have a positive effect on forage by rejuvenating and enhancing the vigor of most major grass and browse species. The amount of benefit would be directly related to the amount and timing of burning. Ponds developed for fire suppression activities or for range improvement would also benefit the horse herd by providing additional water sources and increasing the foraging area by enhancing herd distribution.

Intensive range management actions could provide increased forage; however, with increased livestock numbers there could be competition with cattle for the available forage base. Increased numbers of range land improvement projects could be a positive or negative effect, depending on the type, location, extent, or other attributes specific to the project.

#### Chapter 4 - Environmental Consequences

Fencing in particular, has the potential to be negative if it inhibits or restricts the movement of the horses and precludes their access to traditional watering or foraging areas.

In general, habitat improvement practices for large wildlife herbivores (particularly elk) would be beneficial to wild horses since they share many of the same habitat needs.

Off-highway vehicle use could disturb or harass horses. More restrictions on off-highway vehicles and fewer open roads would be a positive impact to wild horses, proportional to the degree of restrictions. Continuance of the seasonal road closure in the Pokegama area would continue to reduce disturbance through the critical winter period.

Improved riparian and wetland management practices would result in positive effects on the wild horse herd by enhancing forage and water quantity. It is possible, however, that wild horse grazing use, under the Proposed Resource Management Plan, could be sharply curtailed or even eliminated in portions of the herd management area in order to meet the Supplemental Environmental Impact Statement Record of Decision required restrictions due to the Aquatic Conservation Strategy, Late-Successional/District Designated Reserves, and the standard and guideline designed to protect mollusks.

Mineral exploration and development would only affect the local area of surface disturbance. The probability of mineral activity in this area is minimal; therefore, there is low risk of mineral-related effects.

**Alternative No Action.** The Alternative No Action would result in short-term positive effects on the horse herd by providing significant increases in the quantity of forage through a relatively high level of timber cuts. Short-term negative effects would occur with the reduction in quality and quantity of thermal cover. In the long term as a result of silvicultural treatments, the timber stands would approach even-age conditions and although thermal cover quality and quantity would be significantly increased, the forage produced under these stands would be greatly reduced. Livestock grazing would continue at the present level and some competition would continue between horses and cattle. This is not considered a significant effect. Existing seasonal road closures in the herd management area are and would continue to result in reductions of winter harassment.

**Alternative A.** Under this alternative, short-term positive effects could be realized by implementation of intensive timber management practices that would

open timber stand canopies and result in increases in grass and shrub forage species. In the long term, however, as intensive silvicultural practices are completed, such as vegetation control and thinnings, these forage species' abundance would be reduced in favor of tree growth. In the long term, commercial timber types would not produce significant forage. Increased livestock grazing levels would result in an increase of direct competition between cattle and wild horses for the forage base. Off-highway vehicle use would be unrestricted throughout the herd management area allowing for increased potential for year-round disturbance of the herd. Proposed hydroelectric development on the Klamath River could affect winter habitat movements of the herd by development of fences and roads, which could be barriers to use of their habitat. Road development in this area would also increase harassment during the critical winter period.

**Alternative B.** Under Alternative B, timber management would also be intensive. Effects on the horse herd would be much the same as in Alternative A. Intensive timber harvest acres are reduced approximately 10 percent from Alternative A. Seeding of timber harvest units would increase the forage base. Livestock grazing levels and effects would be comparable to Alternative A. Riparian management would be directed toward improving the riparian and wetland areas, resulting in improved quality and quantity of water with a seasonal extension of the water regime. Improved riparian community condition would enhance forage and cover for horses. The effects of off-highway vehicle use and hydro-electric development would be similar to those in Alternative A.

**Alternative C.** Implementation of Alternative C would positively affect the wild horse herd. Timber management and silvicultural practices would result in uneven age stand characteristics that would provide a good ratio of high quality cover areas and forage producing areas. Seeding of timber harvest units would continue and provide additional forage for the horse herd. Restrictions and closures of road use would reduce herd harassment. Livestock grazing levels and effects would be similar to the Alternative No Action. Managing for improved riparian and wetland conditions would result in an improved forage base and quality and quantity of water available.

**Alternative D.** Alternative D would affect the horse herd much the same as Alternative A; however, intensive timber harvest acres are reduced by approximately 25 percent. Seeding of planned harvest units would benefit the horse herd. Livestock grazing levels and effects would be similar to the Alternative No Action. Extensive riparian and/or wetland fencing could affect

traditional herd movements. Improvements in riparian and wetland conditions would result in improved forage base and quality and quantity of water available.

**Alternative E.** Alternative E is generally the most restrictive of the alternatives. With limited acreage available for timber harvest, thermal cover for horses would increase but forage production would be reduced. Livestock grazing levels and effects would be similar to the Alternative No Action. Extensive riparian or wetland fencing would have a negative effect on traditional herd movements within the herd management area. Enhanced riparian and wetland conditions would improve the forage base and add to the quality and quantity of water available.

**The Proposed Resource Management Plan.** The Proposed Resource Management Plan would result in an overall positive benefit to the wild horse herd. Reductions in timber harvest and management for uneven-age stands; implementation of grazing systems and proposed range improvement projects; and improved riparian, wetlands, and water quality would all benefit the herd by providing an appropriate ratio of forage to cover, by reducing forage competition between cattle and horses, and in providing increased quality and quantity of water available. It is possible, however, that wild horse grazing use, under the Proposed Resource Management Plan, could be sharply curtailed or even eliminated in portions of the herd management area in order to meet the Supplemental Environmental Impact Statement Record of Decision required restrictions due to the Aquatic Conservation Strategy, Late-Successional/District Designated Reserves, and the standard and guideline designed to protect mollusks.

## Summary

Timber management activities under Alternatives No Action, A, B, D, and E have negative long-term effects on the wild horse herd by creating even-age stand conditions and a less than desirable forage/cover ratio on those harvested acres. This effect would be greatest in No Action and A, and would decrease significantly in Alternatives B, C, and E. The Proposed Resource Management Plan and Alternative C have positive effects on horses through timber and silvicultural practices that create a favorable cover/forage ratio.

Alternatives A and B increase numbers of livestock grazing in the Pokegama herd management area and thus would lead to greater competition for forage with horses. The Proposed Resource Management Plan and Alternatives C, D, and E all have livestock levels

the same as currently existing, that is, the Alternative No Action. The Proposed Resource Management Plan and all of the alternatives propose various range land improvement projects and grazing systems that would improve forage conditions and thus improve habitat conditions for the horse herd.

Proposals to keep most lands open to off-highway vehicle use under Alternatives A and B would potentially allow for the harassment of the horse throughout the year. A seasonal road closure, now existing (No Action), and affirmed under the Proposed Resource Management Plan and Alternatives C, D, and E, would reduce human and vehicular disturbance during the critical winter period.

Improved riparian, wetland, and stream management would occur throughout the alternatives and the Proposed Resource Management Plan. The extensive fencing proposed in the Proposed Resource Management Plan and under Alternatives D and E may create barriers that could negatively affect movement of the horse herd and restrict the availability of water and forage within the enclosures; resources that are currently available.

Hydroelectric development of the Klamath River under Alternatives A and B would negatively affect winter habitat of the herd. Scenic designation of the upper Klamath River under the Proposed Resource Management Plan and Alternatives C, D, and E would ensure the long-term availability of this area for use by the horse herd.

Wild horse grazing use, under the Proposed Resource Management Plan, could be sharply curtailed or even eliminated in portions of the herd management area in order to meet the Final Supplemental Environmental Impact Statement required restrictions due to the Aquatic Conservation Strategy, Late-Successional/District Designated Reserves, and the standard and guideline designed to protect mollusks. The practical application of these restrictions, in relation to wild horse management, is unpredictable at this time

## Effects on Wildfire

The intensity and size of any wildfire depends largely on the local weather at the time of and following ignition, other factors such as long term and seasonal climatic patterns, the amount and distribution of available fuel, the slope and aspect of the landscape on which the fire is burning, the availability of suppression forces, and the amount of time it takes to



## Chapter 4 - Environmental Consequences

reach the wildfire and take suppression actions. Most of these factors remain constant for any particular site under each of the alternatives, except for the type and level of fuels management. Suppression efficiency and effectiveness analysis is conducted at the activity planning level of management.

Due to the fragmented ownership pattern in most of the planning area, wildfire potential is not dependent on BLM land management activities alone. Historically, the majority of large stand replacement wildfires have involved multiple ownerships and either started in or were intensified by untreated logging and pre-commercial thinning slash fuel. Fire intensity and severity has also increased due to the exclusion of fires from fire dependent ecosystems. Salvage of dead and dying trees in stands could reduce fuel hazards, but is not proposed for all land allocations under all alternatives.

Lightning has historically been the primary cause of wildfires throughout much of the planning area. The occurrence of human-caused wildfires has increased due to arson, recreation use, debris burning by private residences within the rural interface areas, and timber management activities on both private and public land. Certain activities proposed in the alternatives change the risk of large scale, high intensity wildfires. The primary factors that could increase the relative risk of wildfire are an increased amount of fuel produced through timber management and silvicultural stand treatments (such as thinning), the unnatural build up of fuels through fire suppression activities, as well as the natural successional changes in ecosystems. Unless fuels are actively managed, this increased risk will affect the objective of limiting the occurrence of large-scale, high-severity wildfires.

Prescribed burning and other types of fuels management that would reduce fuel buildups could decrease the relative risk of wildfire. Prescribed burning includes both traditional broadcast and pile burning as well as underburning prior to harvest. Underburning, brushland burning, burning of oak savannas, and grassland burning are also proposed as a methods to reintroduce fire into these ecosystems. Each of these ecosystems had some natural fire regime prior to fire suppression and will change species composition, structure, and function without fire as a natural process. Underburning can be used to reduce fuel loading and vertical fuel continuity. Wildfires in stands that were managed using underburning are generally less severe, which aided fire suppression, thereby limiting the size of wildfires while using methods that have a lower environmental impact. This reduces the costs of wildfire suppression, particularly when

underburning is implemented over large areas (U.S. Department of the Interior 1992).

Mosaics of stands and landscapes with varying forest ages, structures and densities, and areas of reduced fuels would allow safe access for fire suppression crews and provide strategic locations for efficient and effective fire suppression. Silvicultural treatments other than prescribed fire would be used in some stands to reduce wildfire hazard. The Proposed Resource Management Plan and Alternative E would have the greatest likelihood of decreasing the risk of wildfires because of the acres of that would be treated with prescribed fire. Conversely, the other alternatives would have a lesser effect on reducing wildfire hazard. The specific effects of fuel reduction to mitigate wildfire risk cannot be fully assessed at this planning scale but should be considered in province-level, watershed and landscape-level analyses, as well as in site-specific planning.

Road closures would affect fire management by increasing response time for initial attack and decreasing effectiveness of fire suppression resources. This could lead to an increase in the number of acres burned during a wildfire.

Forest thinning, conifer release by cutting hardwoods, and thinning of the forest understorey will produce fuels that would remain a fire hazard until the material is reduced by natural decomposition (20 to 30 years). Thinning or brushing early in early successional stages can facilitate practical fuel hazard mitigation. Operationally, some timber harvest units planned for treatment with prescribed fire could not be completed due to timing objectives for reforestation. These "untreated" acres would directly contribute to fuel hazard. Generally fuel hazard problems within the planning area are attributed to past management practices and not those practices that are planned in the Proposed Resource Management Plan where prescribed fire would mimic historic natural disturbance.

Underburning proposed in the alternatives would also reduce the risk of wildfire. Alternatives C, D, E, and the Proposed Resource Management Plan have the highest likelihoods of reducing the risk of wildfire through underburning, while Alternative B has a somewhat lower potential. Under Alternatives No Action and A, a lesser amount of underburning is proposed and this would increase the risk of wildfire over the long term.

Within the rural interface areas, prescribed burning could be limited due to the concerns of residents about smoke and air quality and fire near homes. Without fuel treatment in these areas the risk of



wildfires would continue to grow. This risk can sometimes be decreased by the use of alternative fuel treatments. The projected harvest acres and corresponding level of untreated slash under the Proposed Resource Management Plan would be less than all alternatives, except Alternative E.

## Conclusion

Any alternative that diminishes the role of prescribed fire in the Klamath Basin would increase the potential risk of wildfire due to the increase in the amount of untreated slash, accumulation of fuels, and lack of, or small amount of planned underburning. All alternatives and the Proposed Resource Management Plan would reduce the risk of wildfire compared to the No Action by increased fuels management, including the use of underburning.

While management activities that reduce fuel hazards would help reduce potential wildfire risk, the potential for wildfire on all lands in the planning area under all alternatives would be expected to remain high for the short term. This is due to the continued increase in fuel hazard from timber management activities, conifer mortality associated with drought, and unnatural accumulations of fuels within established stands due to historical suppression of wildfire in some fire dependent or fire adapted plant communities. A total fire protection strategy would likely be unsuccessful in providing protection against catastrophic disturbance in the planning area over the next 50 to 100 years, while fire severity would become skewed toward higher severity levels. The risk of large, high-severity wildfires, as well as potential mitigation of that risk, is best evaluated at the watershed level and was not assessed in this Resource Management Plan.

## Consistency with Other Agency Plans and Programs

Bureau of Land Management planning regulations require that resource management plans be "consistent with officially approved or adopted resource-related plans, and the policies and procedures contained therein, of other federal agencies, state and local governments, and Indian tribes, so long as the guidance and Resource Management Plans are also consistent with the purposes, policies, and programs of federal laws and regulations applicable to public lands..." (43 Code of Federal Regulations

### Consistency with Other Agency Plans and Programs

1610.3-2). In this document, consistency is the absence of conflict. Based on the BLM's knowledge of the plans of other agencies, the alternatives have been compared to the following agencies' plans for consistency, and the BLM has reached the conclusions stated.

## Federal Agencies

All alternatives are believed to be consistent with the following plans of other federal agencies:

The Forest Service's forest-wide land use plans for the adjacent Fremont, Modoc, Rogue River, and Winema National Forests.

The U.S. Fish and Wildlife Service's *Pacific Bald Eagle Recovery Plan* and *Pacific Coast Recovery Plan for the American Peregrine Falcon* (see Effects on Special Status Supplemental Environmental Impact Statement Special Attention Species section).

The Bonneville Power Administration's latest annual Transmission Facilities Resource Program.

Consistency with the U.S. Fish and Wildlife Service's *Recovery Plan for the Northern Spotted Owl* will be addressed in the proposed RMP/final Environmental Impact Statement.

The Animal and Plant Health Inspection Service "Animal Damage Control Program Final Environmental Impact Statement" and subsequent National Environmental Policy Act documents which tier to it.

The Animal and Plant Health Inspection Service "Rangeland Grasshopper Cooperative Management Program Final Environmental Impact Statement" and subsequent National Environmental Policy Act documents which tier to it.

## State Agencies

All alternatives are believed to be consistent with the following plans, programs, and policies of the State of Oregon agencies:

Department of Environmental Quality (see the Effects on Air Resources section):

- ◆ Smoke Management Plan;
- ◆ Visibility Protection Plan and air quality policies;
- ◆ Prevention of Significant Deterioration requirements;

#### Chapter 4 - Environmental Consequences

- ♦ Water Resources Commission rules and statutes;
- ♦ Department of Human Resources, Health Division, standards for public water systems;
- ♦ Department of Agriculture, Noxious Weed Control Policy and Classification System;
- ♦ Division of State Lands, Removal Fill Law;
- ♦ Parks and Recreation Department;
- ♦ Statewide Comprehensive Outdoor Recreation Plan (see the Effects on Recreation section);
- ♦ State Parks and Recreation System Plan;
- ♦ State Recreation Trails Plan (see the Effects on Recreation section);
- ♦ State Historic Preservation Program;
- ♦ Department of Transportation, Highway Division;
- ♦ Oregon Highway Plan;
- ♦ Six Year Highway Improvement Plan; and
- ♦ Economic Development Department, Regional Economic Development Strategies.

Consistency of the alternatives with some other state plans and programs is more complex, as described in the following discussions.

Consistency with the Department of Environmental Quality's Statewide Water Quality Management Plan (including Water Quality Standards and Guidelines) and the state's antidegradation policy would vary by the watershed analyzed. In the Alternative No Action the cumulative effects of timber harvest activities on BLM-administered and other private and public lands risk violation of the state's antidegradation policy in one or more of the watersheds analyzed unless either private activities are less than anticipated (by the BLM) or the BLM can lessen the cumulative effects by scheduling its timber sales at different times than most of the other timber harvest.

Alternatives No Action, C, D, E, and the Proposed Resource Management Plan would find the 11.0 mile stretch of the state scenic waterway stretch of the Klamath River from the J.C. Boyle Powerhouse to the Oregon/California border (segment 2) suitable for designation under the National Wild and Scenic Rivers Act, providing consistent protection for that section of river. The portion of the Klamath River from the J.C. Boyle Dam to the J.C. Boyle Powerhouse (segment 1) was not found suitable for designation under any of the alternatives; however, the lower 2 miles of segment 1 down to the Oregon/California border would be managed as a special recreation management area under all alternatives

providing some measure of protection consistent with the state designation as a state scenic waterway. Alternatives A and B would allow construction of the Salt Caves hydroelectric project which would not be consistent with the state scenic waterway designation. (See the Effects on Wild and Scenic Rivers section for further discussion.)

Alternatives No Action, A, B, and C could fall short of full consistency with Oregon's Statutory Wildlife Policy and the Oregon Threatened and Endangered Species Act. Consistency with the Department of Fish and Wildlife's plans, policies, rules, and objectives is addressed in Appendix X.

Consistency with the Board of Forestry's Forestry Program for Oregon is complex, due to the diversity of goals of the Forestry Program for Oregon. All of the alternatives except A would reduce the acreage of current commercial forest land. Consistency with the five Forestry Program for Oregon objectives is also provided in Appendix X.

Alternatives A, B, and C would not provide specific protection on any BLM-administered land for state listed endangered or candidate plant species identified by the Oregon Department of Agriculture, unless the species are also federally listed. At this time there are no such state listed plant species known to exist on BLM-administered lands in the planning area. If any such species are subsequently listed by the department, these alternatives could be inconsistent with the department's plans for those species (See the Effects on Special Status and Supplemental Environmental Impact Statement Special Attention Species section.)

Alternatives No Action, A, and B would not designate the Old Baldy potential research natural area identified in the Natural Heritage Program administered by the Division of State Lands, and thus would be inconsistent with that program. The other alternatives would be fully consistent with the Natural Heritage Program (see the Effects on Special Areas section for further discussion).

Consistency with the statewide planning goals and guidelines administered by the Land Conservation and Development Commission through the Department of Land Conservation and Development is variable among the twelve goals for which BLM plan consistency is relevant. Oregon's land use plan program was enacted 19 years ago. Today a complex body of land use policy and goal interpretation exists due to the acknowledgement process, goal amendments, Land Conservation and Development

Commission rule making, and Land Use Board of Appeals and appellate court decisions. The matter of BLM consistency with the statewide goals involves a number of interrelated issues of policy, intergovernmental coordination, and state and federal legal requirements. Consistency with these goals is summarized generally in Appendix X.

The statewide planning goals are legally binding on all planning activities relating to land use undertaken by cities, counties, special districts, and state agencies. Klamath County will, over the next few years, be revising its plans to comply with recent administrative rules revisions related to goals 4 and 12 (Forest Lands and Transportation, respectively). In the former instance, this would involve increasing protection of forest lands and resources from conflicting uses and inappropriate rural development.

## **Local Agencies**

The Oregon statewide planning program attaches substantial importance to the coordination of federal plans with acknowledged local comprehensive plans. To the extent that BLM actions and programs are consistent with acknowledged county comprehensive plans and land use regulations, these actions and programs can also be considered consistent with statewide planning goals. Local plans do not, however, address protection of goal 5 values (Open Spaces, Scenic and Historic Areas, and Natural Areas) from the effects of forest management, as state law prohibits local governments from regulating forest practices. The Klamath County comprehensive plan could be affected by the BLM's Resource Management Plan.

The Klamath Falls Resource Area has contributed data for development of county comprehensive plans, has followed the development of those plans through the years, and has consulted on issues of mutual interest. Based on knowledge gained through this involvement, the district planning staff believes that all alternatives are consistent with the Klamath County comprehensive plan and land use regulations except with goal 5. Alternatives A and B would allow permitting and construction of the Salt Caves hydroelectric project. If selected, these alternatives would be inconsistent with the Klamath County Plan.

In May 1994 the Klamath County Commissioners adopted the Klamath County Land and Water Management Plan. This plan outlines the County Commissioners position on local custom and culture. It also reiterates the coordination and consultation requirements of federal agencies. This Resource

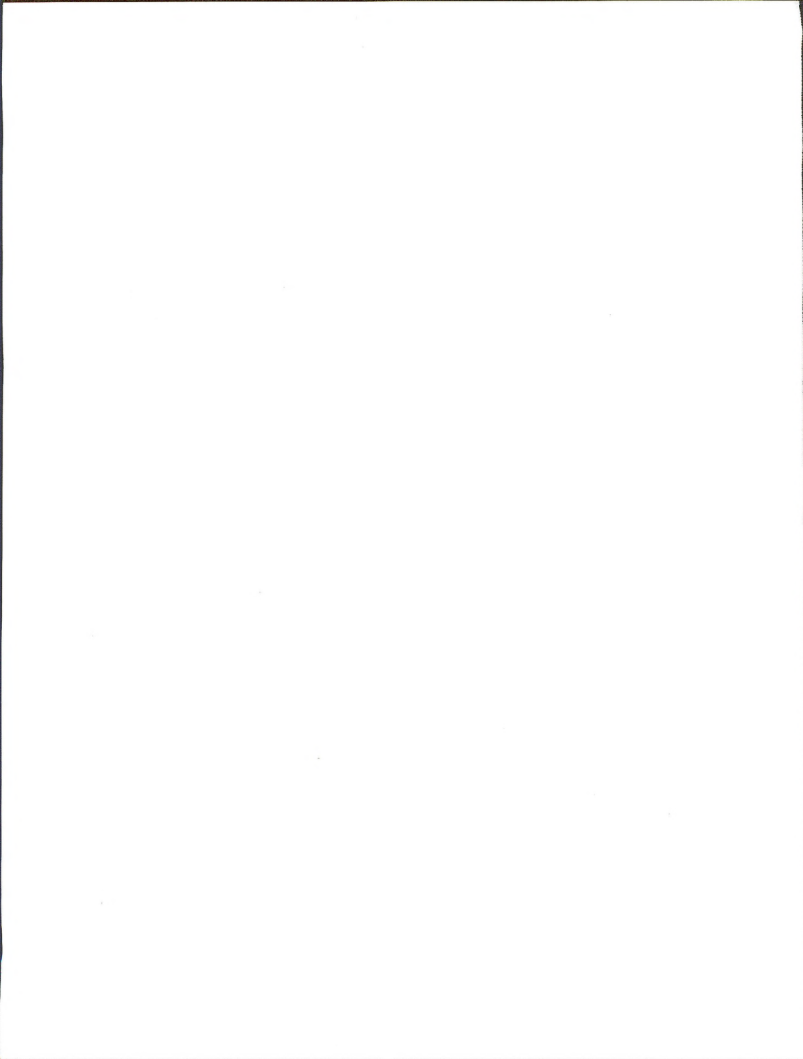
Management Plan is consistent with that portion of the Land and Water Management Plan. Where the county plan is inconsistent with Federal rules, statutes, or management guidelines there may be inconsistencies. Should there be inconsistencies, federal law or policy will be followed.

## **Other Agencies**

### **Klamath River Compact Commission:**

#### **◆ Klamath River Compact.**

The Northwest Power Planning Council has designated the Klamath River as a "protected area" because of its importance as critical fish and wildlife habitat. Under this standard of protection no new hydroelectric development is allowed. Alternatives A and B would allow construction of the Salt Caves hydroelectric project, which could be inconsistent with this designation. The remainder of the alternatives would be consistent with the protected area status.

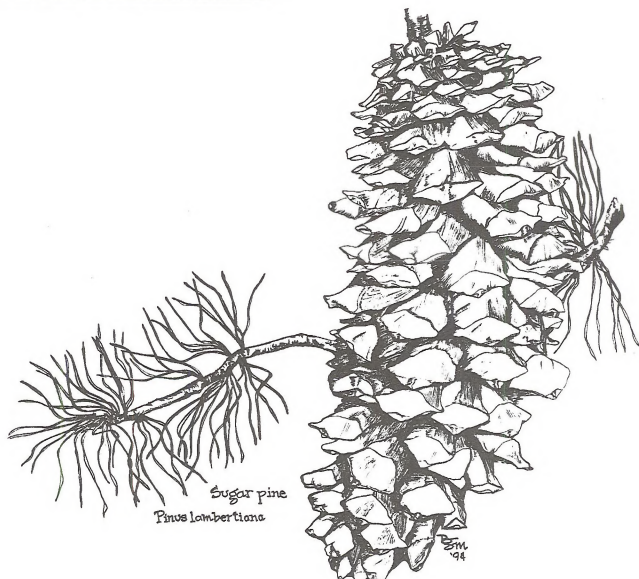


# Chapter 5

## Consultation and Coordination

### Contents

Introduction .....	5-3
Protest Process .....	5-3
Summary of Comments .....	5-4
List of Agencies and Organizations Contacted .....	5-4
Preparers .....	5-9







# Introduction

The Klamath Falls Proposed Resource Management Plan/Environmental Impact Statement was prepared by an interdisciplinary team of specialists from the Klamath Falls Resource Area with assistance from the Oregon state office. Although the actual writing of the draft Resource Management Plan/Environmental Impact Statement (published in August 1992) began in early 1990, and elaborate process that began in 1988 (1986 for the other western Oregon districts) preceded the writing phase. The planning process involved many steps (described in Chapter 1, Planning Process and Criteria), with public participation, as well as consultation and coordination with many agencies and organizations throughout the process.

## Protest Process

The resource management planning process includes an opportunity for administrative review via a plan protest to the BLM Director if you believe the approval of a proposed Resource Management Plan would be in error under 43 Code of Federal Regulations 1610.5-2. Careful adherence to these guidelines will assist in preparing a protest that will assure the greatest consideration to your point of view.

Only those persons or organizations who participated in our planning process leading to this Proposed Resource Management Plan may protest. If our records do not indicate that you had any involvement in any stage in the preparation of the Proposed Klamath Falls Resource Area Resource Management Plan, your protest will be dismissed without further review. A protest must also be limited to a single proposed resource management plan, even if the issue or concern involves more than one proposed resource management plan. Protests that challenge proposed decisions in more than one proposed resource management plan will not be accepted by the Director. In effect, if you may be adversely affected by more than one resource management plan, you must file an individual protest for each resource management plan citing why and where that particular resource management plan is incorrect or not in compliance with existing laws, regulations, etc.

Protests of proposed plan elements that merely adopt decisions made in the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* signed by the Secretary

of the Interior will be dismissed, as the Director has no authority to overrule those decisions.

A protesting party may raise only those issues which he or she submitted for the record during the planning process. New issues identified during the protest period should be directed to the District Manager for consideration during plan implementation, as potential plan amendments, or as otherwise appropriate. If an issue is shared by several individuals or landowners or interest groups, a combined protest on the common neighborhood issue or concern may be mutually more efficient and effective. For example, several landowners in a portion of the planning area may wish to combine their concerns on a proposed land allocation or management issue that affects their common interests in a given watershed.

The period for filing a plan protest begins when the Environmental Protection Agency publishes in the Federal Register its Notice of Availability of the final environmental impact statement concerning the proposed resource management plan or amendment. The protest period extends for 30 days. There is no provision in the BLM's regulations for any extension of time, and no extensions for filing protests will be granted. To be considered "timely," your protest must be postmarked no later than the last day of the protest period. Also, although not a requirement, we suggest that you send your protest by certified mail, return receipt requested.

Protests must be filed in writing to:

Director (760)  
Chief, Planning and Environmental Coordination  
Bureau of Land Management  
1849 "C" Street, NW  
Washington, D.C. 20240

To be considered complete, your protest must contain, at a minimum, the following information:

1. The name, mailing address, telephone number, and interest of the person filing the protest.
2. A statement of the issue or issues being protested.
3. A statement of the part or parts of the specific (named) proposed resource management plan being protested. To the extent possible, this should be done by reference to specific pages, paragraphs, sections, tables, maps, etc. included in the document.
4. A copy of all documents addressing the issue or issues that you submitted during the planning process or a reference to the date the issue or issues were discussed by you for the record.

## Consultation and Coordination

5. A concise statement explaining why the BLM State Director's decision is believed to be incorrect. This is a critical part of your protest. Document all relevant facts. As much as possible, reference or cite the planning documents, environmental analysis documents, and available planning records (for example, meeting minutes or summaries, or correspondence). A protest which merely expresses disagreement with the Oregon State Director's proposed decision, without any data, will not provide us with the benefit of your information and insight. In this case, the Director's review will be based on the existing analysis and supporting data.

## Summary of Comments

Appendix Y contains the list of responders and the summary of comments with the BLM responses. Appendix Z contains letter reproduced from agencies and elected officials. Due to the volume of comments received, only letters from government agencies and elected officials were reproduced. This is in accordance with BLM and National Environmental Policy Act guidelines. This does not reduce the importance of letters received from nongovernmental individuals or groups. The substantive comments are paraphrased as allowed for by the National Environmental Policy Act (40 Code of Federal Regulations 1503.4) to save space.

## List of Agencies and Organizations Contacted and to Whom Copies of the Proposed Resource Management Plan/Final Environmental Impact Statement Have Been Sent

The Resource Management Plan/Environmental Impact Statement team and/or supporting individuals in the Oregon State Office either contacted or received input from many of the following agencies and organizations during the development of this document

and/or the planning steps preceding its development. Copies of the Proposed Resource Management Plan/Final Environmental Impact Statement have been sent to the following federal and state agencies, local governments, and organizations, plus many individuals not listed here.

### Federal Agencies

Department of Agriculture  
U.S. Forest Service  
Soil Conservation Service  
Department of Defense  
U.S. Air Force  
U.S. Army Corps of Engineers  
Department of Energy  
Bonneville Power Administration  
Department of the Interior  
Bureau of Indian Affairs  
Bureau of Land Management  
Bureau of Mines  
Bureau of Reclamation  
U.S. Fish and Wildlife Service  
U.S. Geological Survey  
Minerals Management Service  
National Park Service  
Department of Transportation  
Environmental Protection Agency  
Federal Energy Regulatory Commission  
National Marine Fisheries Service  
National Oceanic & Atmospheric Administration  
U.S. Federal Highway Administration

### Oregon State Agencies

Department of Agriculture  
Department of Economic Development  
Department of Energy  
Department of Environmental Quality  
Department of Fish and Wildlife  
Department of Forestry  
Department of Geology and Mineral Industries  
Department of Justice  
Department of Land Conservation and Development  
Department of Parks and Recreation  
Department of Transportation  
Department of Water Resources  
Employment Division  
Historical Preservation Office  
Legal Services  
Marine Board  
Office of the Governor  
Public Utilities Commission  
State Economist

## **California State Agencies**

Department of Boating and Waterways  
Department of Conservation  
Department of Fish and Game  
Department of Food and Agriculture  
Department of Forestry  
Department of Forestry and Fire Protection  
Department of Parks and Recreation  
Department of Transportation  
Department of Water Resources  
Energy Commission  
State Lands Commission  
Water Resources Control Board

## **Local Government and Other Government Bodies**

Ashland Chamber of Commerce  
Association of O&C Counties  
Benton County Board of Commissioners  
City of Bend  
City of Dorris  
City of Haines  
City of Klamath Falls  
City of Mitchell  
City of Philomath  
City of Prairie City  
City of Prineville  
City of Salem  
Coos County  
Coos-Curry Council of Governments  
Curry County  
Deschutes County  
Douglas County  
Jackson County  
Chamber of Commerce  
Josephine County  
Klamath County  
Libraries  
Department of Public Works  
Board of Commissioners  
Chamber of Commerce  
Economic Development  
Extension Service  
Historical Society  
Planning Department  
School District  
Solid Waste Management  
Klamath Soil and Water Conservation  
Lake County  
Chamber of Commerce  
Board of Commissioners  
Farm Bureau  
Linn County Board of Commissioners

San Bernardino County  
Shasta County Library  
Siskiyou County  
Rural Enterprise Committee  
Board of Supervisors  
Department of Public Works  
Chamber of Commerce  
Planning Department  
Visitor's Bureau

## **Native American Organizations**

California Indian Legal Services  
Columbia River Inter-Tribal Fish Commission  
Confederated Modoc and Paiute Tribes  
Confederated Tribes of Siletz Indians  
Cultural Heritage Foundation  
Klamath Tribes  
Shasta Nation

## **Federal and State Elected Representatives**

Honorable Les AuCoin  
Honorable Peter DeFazio  
Honorable Mark O. Hatfield  
Honorable Wally Herger  
Honorable Glenn E. Otto  
Honorable Robert Packwood  
Honorable Denny Smith  
Honorable Robert L. Smith  
Honorable Ron Wyden  
Representative Bernie Agrons  
Representative Larry Campbell  
Representative Delna Jones  
Representative Kevin L. Mannix  
Representative Bill Markham  
Representative C.R. Norris  
Representative Rodger Wehage  
Senator Bill Bradbury  
Senator John T. Doolittle  
Senator Bob Kintigh

## **Interested Groups, Businesses, and Others**

1000 Friends of Oregon  
A.B.L.E. Rafting Company  
A.R.T.A.  
Advanced Energy Engineering  
Adventure Connection  
Adventures Whitewater  
Advisory Council on Historic Preservation

## *Consultation and Coordination*

All Outdoors Adventure Trips  
All Seasons Sports  
Alta Mage Skiers  
American Fisheries Society  
American Forest Council  
American Graphics  
American Horse Protection Association  
American Mining Congress  
American Mustang and Burro Association  
American River Recreation  
American Rivers, Inc.  
Amoco Production Company  
Ancient Forest Defense Fund  
Anderson Stream Rehabilitation  
Angel Seven-A Ranch  
Arneson & Wales  
Assembly Office of Research  
Associated Chamber of Commerce  
Associated Oregon Industries  
Association of Northwest Steelheaders  
Association of Oregon Archaeologists  
Association of Oregon Counties  
Atlantic Richfield Company  
Audubon Society  
Bar Cl, Inc.  
Basin Eyecare  
Beach's Jewelers, Inc.  
Beak Consultants  
Biblioteek Voor Hedendaagse Dokument  
Blackman Farms  
Boble and Gates  
Bohemia, Inc.  
Butler Forest Products  
BVRD, M. N. F.  
C & N Home Health Care, Inc.  
Caddis Fly Angling Shop  
California Endangered Species Office  
California Trout, Inc.  
Camp Forest Farm  
Cascade Holistic Economic Consultant  
Cascade Timber  
Center for Urban Affairs & Policy Res.  
Century 21 Production Realty  
Charley Livestock Company  
Cheyne Farms  
Chuck Fisher Realtors  
Circle River Ranch  
Clearing Up  
Cogan Sharpe Cogan  
Columbia Plywood Corp.  
Community Development Services  
Conservation Committee  
Crest Fashion and Modeling Academy  
D. R. Johnson Lumber Company  
Defenders of Wildlife  
Denman and Cooney  
Desert Trail Association

Diane Christiansen, Marketing & Dev.  
Diment, Billings, and Walker  
Discount Lumber  
Donner Party Wagonmaster  
Douglas Timber Operators, Inc.  
Ducks Unlimited/Shasta International  
Duncan, Weinberg, Miller & Penbroke  
EA Engineering  
Eagle Sun, Inc.  
Earth First! Siskiyou Chapter  
East Bakersfield High School  
East Oregon Cattle Company  
Eastern Oregon Mining Association  
Ebasco Services, Inc.  
Ecology Center of Southern California  
EIP Associates  
Envirosphere  
Epic Adventures  
ERA Nicholson & Associates  
First Capital  
Five H Ranch  
Forest Conservation Council  
Four Runners 4 Wheel Drive Club  
Friends for Development of Renewable Resources  
Friends of the Earth  
Friends of the Greensprings  
Friends of the River  
Friends of Walker Creek Wetlands  
Georgia-Pacific Corp.  
Geothermal Resources Council  
Gilchrist Timber Company  
Great Out of Doors Rafting  
Grohs Brothers  
Harrington Ranch  
Haskins and Company, Inc.  
Headwaters Adventures  
Headwaters, Inc.  
Herald and News  
Heritage Research Associates, Inc.  
High Desert Museum  
High Desert Trail Riders  
Hoeffler Bros.  
Holman Realty, Inc.  
Horsefly Irrigation District  
Hungry Hollow Youth  
I. F. Rodgers & Sons  
Interagency Archaeological Services  
Izaak Walton League of America  
J. C. Penny  
J. W. Kerns Irrigation Company  
J-Spear Range Company  
Jeld-Wen, Inc.  
Jensen and Associates  
Jespersen Edgewood, Inc.  
JNS Excavation  
Johnson Stock Company  
Jolles, Sokol, and Bernstein



*Agencies and Organizations Contacted*

KAGO-FM 99  
KBOY AM/FM  
KDKF-TV  
KDRV-TV  
KFLS/KKRB  
KLAD Radio  
KOTI-TV  
KTVL - 10 Medford  
Kansas, Oklahoma, and Arkansas River Commission  
Ken Warren Outdoors  
Kingfisher Float Trips  
Kiwanis  
Klamath Basin Horsemen's Club  
Klamath Basin N.W.R.  
Klamath Basin Water Resources Advisory Council  
Klamath Bassmasters  
Klamath Bow Hunters  
Klamath Consulting Service  
Klamath Country Flycasters  
Klamath Insurance Center, Inc.  
Klamath River Compact Commission  
Klamath River Guide & Outfitters  
Klamath Union High School  
Klamath Yacht Club  
Krish Brothers  
Land and Water Associates  
Langell Valley Irrigation  
League of Cities  
Local Residents for Old Growth  
Lost River Ranch  
Mason, Bruce & Girard, Inc.  
Maywood Industries, Inc.  
Mazama High School  
Mazamas  
McVay Farms  
Meadow Lake Inc.  
Medford Mail Tribune  
Menasha Corporation  
Merle West Medical Center  
Mobil Oil Company  
Modoc Lumber Company  
Motorcycle Riding Association, Inc.  
Mountain Resort  
Mountain Title Co.  
MSM Technical Conferences  
Mule Deer Foundation  
National Association of Conservation  
National Council of Paper Industry for Air & Stream  
Improvements  
National Forest Products Association  
National Mustang Association  
National Resources Defense Council  
National Wildlife Federation  
Native Plant Society  
Nature Conservancy  
Nature Society  
Nevin Cattle Company  
Newman Enterprises, Inc.  
Noah's World of Water  
NORS  
Northcoast Environmental Center  
Northern Illinois University  
Northwest Audio & Telecom  
Northwest Coalition for Alternatives to Pesticides  
Northwest Environmental Defense Center  
Northwest Federal Mineral Society  
Northwest Forest Resource Council  
Northwest Forestry Association  
Northwest Forestry Organization  
Northwest Minerals Prospectors Club  
Northwest Mining Association  
Northwest Petroleum Association  
Northwest Power Planning Council  
Northwest Rafter's Association  
Northwest Timber Association  
Northwestern University  
Novak's Auto Parts  
NPSCO  
NRC, Division of Engineering  
O'Connor Livestock  
OACD Forestry Committee  
OK Land and Cattle Company  
Oregon Archaeology Society  
Oregon Cattlemen's Association  
Oregon Council Rock & Mineral Clubs  
Oregon Environmental Council  
Oregon Equestrian Trails  
Oregon Fish and Game Council  
Oregon Forest Industries Council  
Oregon Guides and Packers, Inc.  
Oregon Historical Society  
Oregon Hunter's Association  
Oregon Institute of Technology  
Oregon Kayak & Canoe Club  
Oregon Laser Consultants  
Oregon Natural Desert Association  
Oregon Natural Heritage Program  
Oregon Natural Resources Council  
Oregon River Experiences  
Oregon Rivers Council  
Oregon Sheep Growers  
Oregon Shores Conservation Coalition  
Oregon Small Woodlands Association  
Oregon Sportsmen & Conservationist  
Oregon State University  
Oregon Trout  
Oregon Water Resources Congress  
Oregon Wildlife Federation  
Oregonian  
OSPIRG  
Pacific Logging Congress  
Pacific Northwest 4WD Association  
Pacific Northwest Bell  
Pacific Northwest Forest and Range Experiment  
Station  
Pacific Northwest - RNA Committee

### *Consultation and Coordination*

Pacific Northwest Waterway Association  
Pacific Power and Light Company  
Pape Brothers, Inc.  
Pasadena Area Community College  
Pecos River Compact Commission  
Pelican Tractor Company, Inc.  
Placer Conservation Force  
Planning and Conservation League  
Pope Ranches, Inc.  
Portland State University  
Public Lands Council  
Public Lands Foundation  
Public Lands Protection Planner  
Rajnus Brothers  
Rapid Shooters  
Resource Management International  
Resources Agency of California  
Rocky Point Resort  
Rogue Flyfishers  
Rookstool and Alter  
Rookstool-Hansen Real Estate  
Royal Gorge Resource Area  
Rural Enterprise Committee  
Sage Advisor  
Sage Country Alliance for a Good Environment  
San Francisco Chronicle  
Save Our Ecosystems  
Save Our Klamath Jobs  
Save Our Klamath River  
Scenic Waterway Advisory Commission  
Science Application International Seattle City Lights  
Scott-Free River Expeditions  
Shasta Cascade Wonderland Assoc.  
Shell Western F&P, Inc.  
Sierra Club  
Sierra Whitewater Expeditions  
Silver Cloud Farm  
Siskiyou Daily News  
Smith's River Adventures  
Society for Range Management  
Society of American Foresters  
Sonoma State University  
Southern Oregon Association of Kayakers  
Southern Oregon Citizens Against Toxic Spray  
Southern Oregon Northwest Coalition for Alternatives  
to Pesticides  
Southern Oregon Resource Alliance  
Southern Oregon State College  
Southern Oregon Timber Industry  
Southern Pacific Land Company  
SPAV  
Spokes Unlimited  
Starker Forest, Inc.  
Stoel, Rivers, Boley, Fraser & Wysel  
Sturdi-Craft, Inc.  
Thomas Lumber Company  
Timber Framers Guild

Tri-Power  
Tributary Whitewater Tours  
Trillium Valley Farm  
Trout Unlimited of Oregon  
Tulelake Growers Association  
Tulelake Irrigation District  
Tuolumne Regional Water District  
Turtle River Rafting  
Umatilla Agency  
Union Energy Mining Division  
University of California  
University of Montana  
University of Oregon  
Unlimited Pheasants  
Upback Farms, Inc.  
Upper Cow Creek Community Center  
W. E. T.  
W3 Livestock, Inc.  
Ward's Home Ranch Herefords  
Warm Springs Agency  
Washington County  
Watermaster, Klamath Falls  
Wells Farms, Inc.  
Western Council, Lumber  
Western Forest Industries Association  
Western Forestry & Conservation  
Western Network  
Western Regional Representative  
Western Wood Products Association  
Weyerhaeuser Company  
Whitewater Connection  
Whitewater Excitement, Inc.  
Whitewater Rapid Transit  
Whitewater Voyages  
Wild Horse Organized Assistance  
Wild Water Adventures  
Wild Waters West, Limited  
Wilderness Adventures  
Wilderness Society  
Wildfires Stable  
Wildlife Management Institute  
Wildlife Society  
Willamette Industries, Inc.  
Willamette Timberman Association  
Williams Land Company  
Williams Watershed Protection Assoc.  
Willow Valley Land  
Winthrop Associates  
Yakima, Inc.  
Yurok Transition Team

# Preparers

Name	Responsibilities/Position	Qualifications
<b>Management</b>		
A. Barron Bail	Management Guidance/Klamath Falls Resource Area Manager.	B.S., Range-Forest Management, Colorado State University. BLM, 16 years.
Chuck Graham	BLM Lakeview District Manager and Fremont National Forest Supervisor; Management Guidance	Bachelor of Science, University of Montana; Forest Service - Region 6, 31 years; BLM - 6 months.
<b>RMP/EIS Team</b>		
Kristin Bail	Soils, Water Resources, Riparian/Hydrologist.	B.S., Geology, Washington State University. BLM, 10 years.
Dale E. Bays	Timber Supply Analysis/ State Office Economist.	B.S., Forestry, State University New York, Graduate Studies in Economics; State University New York and Utah State University.
Susan Bond	Typesetter, Data Processing/ Editorial Assistant.	BLM, 3 years. Private Industry, 5 years.
Tom Cottingham	Lands, Land Tenure, Rights-of-Way, Easements, Monitoring Plan/Realty Specialist.	B.S., Wildlife Management, Humboldt State University; Post Graduate Work at Humboldt State University. BLM, 14 years; FWS, 6 months.
Dana Eckard	Livestock Grazing/Range Conservationist.	B.S., Agronomy, Iowa State University. BLM, 3 year; SCS, 7 years.
Joe Foran	Fire Management, Air Quality, Global Climate/Fuels Management Specialist.	A.A., Wood Industries, Southwestern Oregon Community College. BLM, 21 years; USFS, 1 year.

*Consultation and Coordination*

<b>Name</b>	<b>Responsibilities/Position</b>	<b>Qualifications</b>
Leslie Frewing-Runyon	Socioeconomics/State Office Economist.	B.A., Economics, Willamette University; BLM 5 years.
Ron Hicks	Wildlife, Special Status Animals/Wildlife Biologist.	B.S. Wildlife Management, Humboldt State University. USFS, 8 mos.; NPS, 8 mos; USFWS, 18 mos.; Private, 1 year; NMFS, 18 mos. BLM, 7 years.
Cathy Humphrey	RMP Team Leader/Natural Resource Specialist.	B.S. Geology, New Mexico State University. BLM, 13 years.
William D. Johnson	Timber/Silviculturist.	B.S., Forest Management, University of Minnesota. BLM, 24 years.
Bill Lindsey	Range Conservationist	B.S., Range Resource Management, Oregon State University. BLM, 15 years.
Brian McCarty	Road Management/Civil Engineering Technician.	BLM, 13 years; USFS, 1 year.
Rob McEnroe	GIS Coordinator, Ten-Year Representative Timber Management Scenarios/Plans and GIS Forester.	B.S., Forestry, University of Montana. BLM, 15 years; USFS, 3 years.
Gregory Reddell	TRIM-PLUS, Forest Operation Inventory/Silviculture Technician.	B.S., Natural Resource Management, University of Wisconsin. BLM, 14 years; USFS, 2 years; Wisconsin Department of Natural Resources, 3 years.
V. Scott Senter	Recreation, Special Areas, Visual Resources, Wilderness/Outdoor Recreation Planner.	B.S., Forest Management, University of Washington. BLM, 14 years; BIA, 1 year.
Dennis Simontacchi	Energy and Minerals/District Geologist.	B.A., Geology, University of California. BLM, 20 years; USBR, 6 years.

Name	Responsibilities/Position	Qualifications
Gayle Sitter	Wildlife, Fisheries, Riparian, Wild Horses, Old Growth Ecosystems/ Wildlife Biologist.	B.S., Wildlife Management, University of Minnesota. M.S., Wildlife Resources, University of Idaho. BLM, 14 years; USGS, 6 months; USFS, 2 years; State, 5 years.
Jim Vienop	RMP Team Leader, Technical Coordination/Writer-Editor.	B.A., Biology, Humboldt State University; Peace Corps, 2.5 years; BLM, 3 years.
Louis Whiteaker	Special Status Plants, Vegetation, Biological Diversity/ Botanist.	B.S., Finance, University of So. California; M.S., Botanical Sciences, University of Hawaii. BLM, 4 years; NPS, 3 years; Research Asst., Standord Univ; 2 years; Research Asst, Univ. of Hawaii, 5 years.
William D. Yehle	Archaeologist	B.A., Anthropology, Boise State University, M.A. Public History (Cultural Resource Management and Historic Preservation), Boise State University. BLM, 4 years; USFS, 2 years; Idaho Dept. of Parks and Recreation, 2 years; Private Industry, 14 years.

### Other Preparers/Reviewers

Michael Bechdolt	Timber Review/Timber Manager	B.S., Forest Resource Management, Humboldt State Univ.; BLM, 14 years; USFS, 8 years.
Mel Crockett	Document Review/KFRA Chief, Branch of Forestry.	B.S., Forestry, Washington State University. BLM, 23 years.
Larry Frazier	Document Review/District Forester.	B.S., Forest Resource Management, Humboldt State Univ. BLM, 16 years; USFS, 2 years
Roy Masinton	Document Review/KFRA Chief Branch of Multiple Resources	B.S., Fisheries Biology, Colorado State University, BLM, 16 years.



## *Consultation and Coordination*

<b>Name</b>	<b>Responsibilities/Position</b>	<b>Qualifications</b>
<b>Other Contributors</b>		
Scott Brayton	Writer/Editor (Salem District)	BLM 16 years.
Chris Cadwell	MICRO*STORMS Coordinator/ Natural Resource Database Specialist.	B.S., Forest Management, Humboldt State University. BLM, 13 years.
Duane Dippon	Automated Resource Data/ State Office GIS Specialist.	PhD Forest Economics, Oregon State University; MSF & BSF Forest Management, Purdue University. Associate Professor in Forest Management and Quantitative Methods (including GIS), BLM, 5 years ; University of Florida, 8 years.
Rebecca Gravenmier	GIS Coordination, Development of GIS Computer Programs/ State Office Natural Resources Specialist and GIS User Analyst.	B.S., Utah State University. BLM, 8 years.
Phil Hamilton	Planning Process Coordinator/ State Office Planning Specialist.	B.S., Forestry, State University of New York; Graduate Studies in Public Administration and Economics. BLM, 37 years.
Robert Lewis	Timber, Vegetation, Biological Diversity, Old Growth, Ecology Issues, Silvicultural Systems, Growth and Yield Modeling, and Habitat Modeling/Medford District Silviculturist.	B.S., Forest Science; M.S., Forestry (Silviculture and Ecology), Penn State University. BLM, 24 years.
Robert Marlow	Forest Inventory, ASQ Determination, and Acreage Data Computation/ Medford District Forest Inventory Specialist.	B.S., Forest Management, Southern Illinois University. BLM, 23 years.
Barb Masinton	Artwork	B.S. Horticulture, Colorado State University; Natural Resource Specialist/Botanist. BLM, 15 years.

Name	Responsibilities/Position	Qualifications
Jeffery S. Nighbert	Biological Diversity Team Member, Hexagon Analysis, GIS Technical Advisor/State Office Senior Technical Specialist for Land Information Systems.	BUS, University of New Mexico (specializing in geography), M.A., University of New Mexico, Geography, (specializing in methodologies). BLM, 16 years, GIS Specialist, 12 years.
David A. Perry	Conceptual design of biological diversity elements of alternative C, training of BLM personnel on addressing biological diversity in western Oregon RMPs/OSU Professor.	Professor of Ecosystem Studies Department of Forest Science, Oregon State University.
Corey Plank	Cartography/State Office Cartographer.	B.S. Geography, Oregon State University. BLM, 7 years ; Washington County, 6 mos.
Zane G. Smith	Conceptual design of biological diversity elements of alternative C, training of BLM personnel on addressing biological diversity in western Oregon RMPs/Consultant, American Forestry Association Field Representative, Eugene, Oregon.	Retired Regional Forester, U.S. Forest Service.
Peter Teensma	Fire Ecologist/Oregon State Office	PhD. in Geography, University of Oregon. US Forest Service/BLM, 9 years.

### Former Contributors

Carla Burnside	Cultural Resources/Archaeologist.	B.A. Anthropology, Washington State University; M.S. Anthropology, University of Oregon. USFWS, 1 year; BLM, 4 years; Private, 4 years.
Jon Collins	Livestock Grazing/Range Conservationist.	B.S. Renewable Natural Resources, University of California Davis. BLM, 15 years.
Don Hann	Cultural Resources/Archaeologist.	B.A., Anthropology, University of Oregon. BLM, 2 years; USFS, 1 year.

### *Consultation and Coordination*

<b>Name</b>	<b>Responsibilities/Position</b>	<b>Qualifications</b>
Gary L. Cowie	Typesetting/ Information Specialist.	B.A., Psychology, University of Calif, Stanislaus, Senior student at Oregon Institute of Technology, Industrial Management w/ Technical Writing Option.
Jean Nelson	Editing of Chapter 3/Writer-Editor.	B.A. Journalism and English, University of Oregon. BLM, 5 years. USFS, 8 mos.
Denise Patterson	Artwork	
Clint Oke	Natural Resources Specialist/ District Range Conservationist.	B.S. Range Management, Washington State University. BLM, 19 years.
David Pulliam	Document Review/KFRA Chief, Branch of Multiple Resources.	B.S., Range Management, M.S., Range and Forest Management, Washington State University. BLM, 18 years.
Renee Snyder	Public Involvement, Document Review, Technical Coordination/District Public Affairs Officer, Planning Environmental Coordinator.	B.S., Earth Science, Montana State University. BLM, 9 years; USFS, 4 years; National Weather Service, 2 years.
Elizabeth Sobel	Cultural Resources/Archaeologist.	B.A., Archaeological Studies, Yale University. BLM, 4 years; Private Industry, 6 months; State and other federal agencies, 1 year.

# Chapter 6

## Glossary, References Cited, and Index

### Contents

Glossary .....	6-1
References Cited .....	6-20
Index .....	6-39



White pelican





# Glossary

**Activity Plan** - A document that describes management objectives, actions and projects to implement decisions of the RMP or other planning documents. Usually prepared for one or more resources in a specific area.

**Adaptive Management Areas** - Landscape units designated for development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives.

**Age Class** - One of the intervals into which the age range of trees is divided for classification or use.

**Airshed** - A geographical area that shares the same air mass due to topography, meteorology, and climate.

**Allowable Cut Effect** - The expected contribution to the PSQ resulting from future management decisions.

**Anadromous Fish** - Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Salmon, steelhead, and shad are examples.

**Analysis of the Management Situation (AMS)** - A document that summarizes important information about existing resource conditions, uses and demands, as well as existing management activities. It provides the baseline for subsequent steps in the planning process, such as the design of alternatives and affected environment.

**Analytical Watershed** - For planning purposes, a drainage basin subdivision of the planning area used for analyzing cumulative effects on resources.

**Animal Damage** - Injuries inflicted upon forest tree seed, seedlings, and young trees through seed foraging, browsing, cutting, rubbing, or trampling; usually by mammals and birds.

**Animal Unit Month (AUM)** - The amount of forage necessary for the sustenance of one cow or its equivalent for one month. The animal unit month equivalents used for analysis during the planning process are as follows: 1 horse = 1.25 Animal Unit Months; 3 elk = 1 Animal Unit Month; 5 mule deer (east side) = 1 Animal Unit Month; 6 blacktail deer (west side) = 1 Animal Unit Month; and 7 antelope = 1 Animal Unit Month. These figures (with the exception of horses) were mutually agreed upon with the

Oregon Department of Fish and Wildlife and have been added to the Proposed Resource Management Plan/Environmental Impact Statement.

**Aquatic Ecosystem** - Any body of water, such as a stream, lake, or estuary, and all organisms and nonliving components within it, functioning as a natural system.

**Aquatic Habitat** - Habitat that occurs in free water.

**Archaeological Site** - A geographic locale that contains the material remains of prehistoric and/or historic human activity.

**Area of Critical Environmental Concern (ACEC)** - An area of BLM-administered lands where special management attention is needed to protect and prevent irreparable damage to important historic, cultural or scenic values, fish and wildlife resources or other natural systems or processes; or to protect life and provide safety from natural hazards. (Also see Potential ACEC.)

**Area of Critical Mineral Potential** - An area nominated by the public as having mineral resources or potential important to the local, regional, or national economy.

**Area Regulation** - A method of scheduling timber harvest based on dividing the total acres by an assumed rotation.

**Automated Resource Data (ARD)** - Computerized map data used for the management of resources.

**Available Forest Land** - That portion of the forested acres for which timber production is planned and included within the acres contributing to the allowable sale quantity. This includes both lands allocated primarily to timber production and lands on which timber production is a secondary objective.

**Back Country Byway** - A road segment designated as part of the National Scenic Byway System.

**Basal Area** - The area of the cross section of a tree stem near its base, generally at breast height, 4.5 feet above the ground and inclusive of bark.

**Baseline** - The starting point for analysis of environmental consequences; may be the conditions at a point in time (for example, when inventory data is collected) or may be the average of a set of data collected over a specified period of years.

**Basic Resource Unit (BRU)** - A term used in TRIM-PLUS for the smallest unit of timberland that has been identified in the inventory.

**Basin Programs** - Sets of state administrative rules that establish types and amounts of water uses allowed in the state's major river basins and form the basis for issuing water rights.

**Beneficial Use** - The reasonable use of water for a purpose consistent with the laws and best interest of the peoples of the state. Such uses include, but are not limited to, the following: instream, out of stream and groundwater uses, domestic, municipal, industrial water supply, mining, irrigation, livestock watering, fish and aquatic life, wildlife, fishing, water contact recreation, aesthetics and scenic attraction, hydropower, and commercial navigation.

**Best Management Practices (BMP)** - Methods, measures, or practices designed to prevent or reduce water pollution. Not limited to structural and nonstructural controls, and procedures for operations and maintenance. Usually, BMPs are applied as a system of practices rather than one single practice.

**Big Game** - Large mammals that are hunted, such as Roosevelt elk, black-tailed deer, and black bear.

**Biological Corridor** - A habitat band linking areas reserved from substantial disturbance.

**Biological Diversity** - The variety of life and its processes.

**Biological Legacies** - Components of the forest stand (for example, large trees, down logs, and snags) reserved from harvest to maintain site productivity and to provide structure and ecological functions in subsequent forest stands.

**Board Foot (BF)** - A unit of solid wood, one foot square and one inch thick.

**Broadcast Burn** - Allowing a prescribed fire to burn over a designated area within well defined boundaries for reduction of fuel hazard or as a silvicultural treatment, or both.

**Bureau Assessment Species** - Plant and animal species on List 2 of the Oregon Natural Heritage Data Base, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040), that are identified in BLM Instruction Memo No. OR-91-57, and are not included as federal candidate, state listed or Bureau sensitive species.

**Bureau Sensitive Species** - Plant or animal species eligible for federal listed, federal candidate, state listed, or state candidate (plant) status, or on List 1 in the Oregon Natural Heritage Database, or approved for this category by the State Director.

**Candidate Species** - Those plants and animals included in Federal Register "Notices of Review" that are being considered by the U.S. Fish and Wildlife Service (USFWS) for listing as threatened or endangered. There are two categories that are of primary concern to the BLM. These are:

**Category 1.** Taxa for which the USFWS has substantial information on hand to support proposing the species for listing as threatened or endangered. Listing proposals are either being prepared or have been delayed by higher priority listing work.

**Category 2.** Taxa for which the USFWS has information to indicate that listing is possibly appropriate. Additional information is being collected.

**Casual Use** - Activities ordinarily resulting in negligible disturbance of federal lands and resources and do not require authorization.

**Cavity Excavator** - A wildlife species that digs or chips out cavities in wood to provide a nesting, roosting, or foraging site.

**Cavity Nesters** - Wildlife species, most frequently birds, that require cavities (holes) in trees for nesting and reproduction.

**Characteristic Landscape** - The established landscape within an area being viewed. This does not necessarily mean a naturalistic character. It could refer to an agricultural setting, an urban landscape, a primarily natural environment, or a combination of these types.

**Class I (air quality) Areas** - Special areas (that is, national parks, certain wilderness areas) protected for their air quality related values.

**Clearcut Harvest** - A timber harvest method in which all trees are removed in a single entry from a designated area, with the exception of wildlife trees or snags, to create an even-age stand.

**Closed Discretionary** - See Mineral Restriction Categories.

**Closed Nondiscretionary** - See Mineral Restriction Categories.

**Coastal Oregon Productivity Enhancement Program (COPE)** - A cooperative research and education program to identify and evaluate existing and new opportunities to enhance long-term productivity and economic/social benefits derived from the forest resources of coastal Oregon.

**Commercial Forestland** - Land declared suitable for producing timber crops and not withdrawn from timber production for other reasons.

**Commercial Thinning** - The removal of merchantable trees from an even-aged stand to encourage growth of the remaining trees.

**Commercial Tree Species** - Conifer species used to calculate the commercial forest land allowable sale quantity. They are typically utilized as saw timber and include species such as Douglas fir, hemlock, spruce, fir, pine and cedar. (Also see Noncommercial Tree Species).

**Commodity Resources** - Goods or products of economic use or value.

**Community Stability** - The capacity of a community (incorporated town or county) to absorb and cope with change without major hardship to institutions or groups within the community.

**Community Water System** - See Public Water System.

**Concern** - A topic of management or public interest that is not well enough defined to become a planning issue, or does not involve controversy or dispute over resource management activities or land use allocations or lend itself to designating land use alternatives. A concern may be addressed in analysis, background documents, or procedures or in a noncontroversial decision.

**Congressionally Reserved Areas** - Areas that require Congressional enactment for their establishment, such as national parks, wilderness and wild and scenic rivers.

**Connectivity** - A measure of the extent to which conditions between late-successional/old-growth forest areas provide habitat for breeding, feeding, dispersal, and movement of late-successional/old-growth-associated wildlife and fish species.

**Consistency** - Under the Federal Land Policy and Management Act, the adherence of BLM resource management plans to the terms, conditions and decisions of officially approved and adopted resource related plans, or in their absence, with policies and programs of other federal agencies, state and local governments and Indian tribes, so long as the plans are also consistent with the purposes, policies, and programs of federal laws and regulations applicable to BLM-administered lands. Under the Coastal Zone Management Act, the adherence to approved state management programs to the maximum extent

practicable, of federal agency activities affecting the defined coastal zone.

**Coos Bay Wagon Road (CBWR) Lands** - Public lands granted to the Southern Oregon Company and subsequently reconveyed to the United States.

**Core Area** - That area of habitat essential in the breeding, nesting, and rearing of young, up to the point of dispersal of the young.

**Cover** - Vegetation used by wildlife for protection from predators, or to mitigate weather conditions, or to reproduce. May also refer to the protection of the soil and the shading provided to herbs and forbs by vegetation.

**Critical Habitat** - Under the Endangered Species Act, (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species when it is determined that such areas are essential for the conservation of the species.

**Crucial Habitat** - Habitat which is basic to maintaining viable populations of fish or wildlife during certain seasons of the year or specific reproduction periods.

**Cubic Foot** - A unit of solid wood, one foot square and one foot thick.

**Cull** - A tree or log which does not meet merchantable specifications.

**Culmination of Mean Annual Increment (CMAI)** - The peak of average yearly growth in volume of a forest stand (total volume divided by age of stand).

**Cultural Resource** - Any definite location of past human activity identifiable through field survey, historical documentation, or oral evidence; includes archaeological or architectural sites, structures, or places, and places of traditional cultural or religious importance to specified groups whether or not represented by physical remains.

**Cultural Site** - Any location that includes prehistoric and/or historic evidence of human use or that has important sociocultural value.

**Cumulative Effect** - The impact that results from identified actions when they are added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such other actions.

## **Chapter 6 - Glossary, References Cited, and Index**

Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Dead and Down Woody Material - All woody material, from whatever source, that is dead and lying on the forest floor.

Debris Torrent - Rapid movement of a large quantity of materials (wood and sediment) down a stream channel during storms or floods. This generally occurs in smaller streams and results in scouring of streambeds.

Density Management - Cutting of trees for the primary purpose of widening their spacing so that growth of remaining trees can be accelerated. Density management harvest can also be used to improve forest health, to open the forest canopy, or to accelerate the attainment of old growth characteristics if maintenance or restoration of biological diversity is the objective.

Departure (from even flow) - A timber sale level that deviates from sustainable sale levels through a planned temporary increase or decrease in the allowable sale quantity. Must be economically and biologically justified.

Designated Area - An area identified in the Oregon Smoke Management Plan as a principal population center requiring protection under state air quality laws or regulations.

Designated Conservation Area - A contiguous area of habitat to be managed and conserved for spotted owls as described in the U.S. Fish and Wildlife Service's Final Draft Recovery Plan for the Northern Spotted Owl.

Developed Recreation Site - A site developed with permanent facilities designed to accommodate recreation use.

Diameter at Breast Height (DBH) - The diameter of a tree 4.5 feet above the ground on the uphill side of the tree.

Dispersed Recreation - Outdoor recreation in which visitors are diffused over relatively large areas. Where facilities or developments are provided, they are primarily for access and protection of the environment rather than comfort or convenience of the user.

District Defined Reserves - Areas designated for the protection of specific resources, flora and fauna, and other values. These areas are not included in other land use allocations nor in the calculation of the PSQ.

Domestic Water Supply - Water used for human consumption.

Early Seral Stage - The period from disturbance to crown closure of conifer stands, usually occurring from 0-15 years. Grass, herbs, or brush are plentiful.

Ecological Forestry - A set of forest management concepts which seek to maintain or recreate timber stand and landscape biological diversity. Also termed "New Perspectives", "New Forestry" and "Sustainable Forestry."

Ecological Health - The condition of an ecosystem in which processes and functions are adequate to maintain diversity of biotic communities commensurate with those initially found there.

Economically Feasible - Having costs and revenues with a present net value greater than zero.

Economically Marginal Lands - Lower site or isolated parcels of lands identified as not permitting economically viable management using conventional logging and management strategies, but capable of contributing to local economies if management was subsidized or higher stumpage values could be realized.

Ecosystem Diversity - The variety of species and ecological processes that occur in different physical settings.

Ecosystem Management - The management of lands and their resources to meet objectives based on their whole ecosystem function rather than on their character in isolation. Management objectives blend long-term needs of people and environmental values in such a way that the lands will support diverse, healthy, productive and sustainable ecosystems.

Edge Effect - An ecologically biological effect which occurs in the transition zone where two plant communities or successional stages meet and mix.

Effective Old Growth Habitat - Old growth forest largely unmodified by external environmental influences (for example, wind, temperature, encroachment of nonresident species) from nearby, younger forest stands. Also referred to as interior habitat. For purposes of analysis, assumed to be at least 400 feet from an edge with an adjacent stand younger than age class 70.

Eligible River - A river or river segment found, through interdisciplinary team and, in some cases, interagency review, to meet Wild and Scenic River Act criteria of being free-flowing and possessing one or more outstandingly remarkable values.



**Endangered Species** - Any species defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range and published in the Federal Register.

**Environmental Assessment (EA)** - A systematic analysis of site-specific BLM activities used to determine whether such activities have a significant effect on the quality of the human environment and whether a formal environmental impact statement is required; and to aid an agency's compliance with NEPA when no EIS is necessary.

**Environmental Impact** - The positive or negative effect of any action upon a given area or resource.

**Environmental Impact Statement (EIS)** - A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major federal action.

**Ephemeral Streams** - Streams that contain running water only sporadically, such as during and following storm events.

**Established Stand** - A reforestation unit of suitable trees that are past the time when considerable juvenile mortality occurs. The unit is no longer in need of measures to ensure survival but is evaluated for measures to enhance growth.

**Even-Aged Management** - A silvicultural system which creates forest stands that are primarily of a single age or limited range of ages.

**Existing Stand Condition (ESC)** - An artificial classification that groups forest stands with similar management potential into categories matched to tables expressing yield at various stand ages under various combinations of silvicultural treatment.

**Extensive Recreation Management Areas (ERMAs)** - All BLM-administered lands outside Special Recreation Management Areas. These areas may include developed and primitive recreation sites with minimal facilities.

**Forest Canopy** - The cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

**Forest Health** - The ability of forest ecosystems to remain productive, resilient, and stable over time and to withstand the effects of periodic natural or human-caused stresses such as drought, insect attack, disease, climatic changes, flood, resource management practices and resource demands.

**Forest Land** - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and that has not been developed for nontimber use.

**Forest Succession** - The orderly process of change in a forest as one plant community or stand condition is replaced by another, evolving towards the climax type of vegetation.

**Fragile Nonsuitable** - A TPCC classification indication forest land having fragile conditions, which, if harvested, would result in reduced future productivity; even if special harvest or restrictive measures are applied. These fragile conditions are related to soils, geologic structure, topography, and ground water.

**Full Log Suspension** - Suspension of the entire log above the ground during yarding operations.

**General Forest Management Area** - Forest land managed on a regeneration harvest cycle of 70-110 years. A biological legacy of six to eight green trees per acre would be retained to assure forest health. Commercial thinning would be applied where practicable and where research indicates there would be gains in timber production.

**Genetic Diversity** - The variety within populations of a species.

**Green Tree Retention** - A stand management practice in which live trees as well as snags and large down wood, are left as biological legacies within harvest units to provide habitat components over the next management cycle.

**High Level** - A regeneration harvest designed to retain the highest level of live trees possible while still providing enough disturbance to allow regeneration and growth of the naturally occurring mixture of tree species. Such harvest should allow for the regeneration of intolerant and tolerant species. Harvest design would also retain cover and structural features necessary to provide foraging and dispersal habitat for mature and old growth dependant species.

**Low Level** - A regeneration harvest designed to retain only enough green trees and other structural components (snags, coarse woody debris, etc.) to result in the development of stands that meet old growth definitions within 100 to 120 years after harvest entry, considering overstory mortality.

**Gross Yarding** - Removal of all woody material of specified size from a logging unit to a landing.



**Group Resource Unit (GRU)** - A term used in TRIM-PLUS for each collection of current and future management instructions and data sources for the Basic Resource Units that are proposed to be managed to meet a particular set of management objectives.

**Habitat Diversity** - The number of different types of habitat within a given area.

**Habitat Fragmentation** - The breaking up of habitat into discrete islands through modification or conversion of habitat by management activities.

**Habitat Management Plan** - See Activity Plan.

**Hardwood Site** - A forest site occupied by hardwoods that is unsuitable for the production of conifer species.

**Hazardous Materials** - Anything that pose a substantive present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

**Hiding Cover** - Generally, any vegetation used by wildlife for security or to escape from danger; however, more specifically, any vegetation capable of providing concealment (for example, hiding 90 percent of an animal) from human view at a distance of 200 feet or less.

**Historic Site** - A cultural resource resulting from activities or events dating to the historic period (generally post 1830 A.D. in western Oregon).

**Home Range** - The area that an animal traverses in the scope of normal activities; not to be confused with territory which is the area an animal defends.

**Hyporheic Zone** - The area under the stream channel and floodplain that contributes to the stream.

**Impact** - A spatial or temporal change in the environment caused by human activity.

**Improved Seed** - Seed originated from a seed orchard or selected tree(s) whose genetic superiority in one or more characters important to forestry has been proven by tests conducted in specific environments.

**Infiltration (soil)** - The movement of water through the soil surface into the soil.

**Instant Study Area** - A natural area formally identified by BLM for accelerated wilderness review, by notice published before October 21, 1975.

**Integrated Pest Management (IPM)** - A systematic approach that uses a variety of techniques to reduce pest damage or unwanted vegetation to tolerable levels. Such techniques may include natural predators and parasites, genetically resistant hosts, environmental modifications and, when necessary and appropriate, chemical pesticides or herbicides.

**Integrated Vegetation Management** - See Integrated Pest Management.

**Intensively Managed Timber Stands** - Forest stands managed to obtain a high level of timber volume or quality through investment in growth enhancing practices, such as pre-commercial thinning, commercial thinning, and fertilization. Not to be confused with the allocations of "lands available for intensive management of forest products."

**Intensive Forest Management Practices** - The growth enhancing practices of release, pre-commercial thinning, commercial thinning, and fertilization, designed to obtain a high level of timber volume or quality.

**Intermittent Stream** - Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two criteria.

**Inventory River** - A potential wild, scenic, or recreational river identified in the 1982 National Rivers Inventory (NRI) published by the National Park Service.

**Irreversible or Irretrievable Commitment of Resources** - Effect of an action or inaction that cannot be reversed within a reasonable time.

**Issue** - A matter of controversy or dispute over resource management activities that is well defined or topically discrete. Addressed in the design of planning alternatives.

**Land Use Allocations** - Allocations which define allowable uses/activities, restricted uses/activities, and prohibited uses/activities. They may be expressed in terms of area such as acres or miles etc. Each allocation is associated with a specific management objective.

**Landing** - Any place on or adjacent to the logging site where logs are assembled for further transport.

**Landscape** - A heterogeneous land area with interacting ecosystems that are repeated in similar form throughout.

**Landscape Diversity** - The size, shape, and connectivity of different ecosystems across a large area.

**Landscape Features** - The land and water form, vegetation, and structures that compose the characteristic landscape.

**Large Wood Debris** - Pieces of wood larger than ten feet long and six inches in diameter, in a stream channel.

**Late Seral Stage** - See Seral Stages.

**Late-Successional Forests** - Forest seral stages which include mature and old-growth age classes.

**Late-Successional Reserve** - A forest in its mature and/or old growth stages that has been reserved.

**Leasable Minerals** - Minerals that may be leased to private interests by the federal government. Includes oil, gas, geothermal resources, and coal.

**Locatable Minerals** - Minerals subject to exploration, development and disposal by staking mining claims as authorized by the Mining Law of 1872 (as amended). This includes valuable deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

**Log Decomposition Class** - Any of five stages of deterioration of logs in the forest; stages range from essentially sound (class 1) to almost total decomposition (class 5).

**Long Term** - The period starting 10 years following implementation of the Resource Management Plan. For most analyses, long term effects are defined as those existing 100 years after implementation.

**Long-Term Soil Productivity** - The capability of soil to sustain inherent, natural growth potential of plants and plant communities over time.

**Long-Term Sustained Yield (LTSY)** - Estimated timber harvest that can be maintained indefinitely, once all stands have been converted to a managed state under a specific management intensity.

**Lumber and Wood Products, Except Furniture** - An industrial classification that includes logging contractors engaged in cutting timber and pulpwoods: merchant sawmills, lath mills, shingle mills, planing mills, plywood mills, and veneer mills engaged in producing lumber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes. Certain types of establishments producing wood products are classified elsewhere, for

example, furniture and office and store fixtures are in a different classification.

**Major Plant Grouping** - An aggregation of plant associations with similar management potential and with the same dominant late seral species and the same major early seral species. Late seral rather than climax species are used because late seral species are usually present rather than climax communities and because most old growth plant communities on BLM-administered lands are made up of late seral species rather than climax species in the upper canopy.

**Management Actions/Direction** - Measures planned to achieve the stated objective(s).

**Management Activity** - An activity undertaken for the purpose of harvesting, traversing, transporting, protecting, changing, replenishing, or otherwise using resources.

**Management Framework Plan (MFP)** - A land use plan that established coordinated land use allocations for all resource and support activities for a specific land area within a BLM district. It established objectives and constraints for each resource and support activity and provided data for consideration in program planning. This process has been replaced by the Resource Management Planning process.

**Management Intensity (MI)** - An expression of a potential type of management for a Group Resource Unit in TRIM-PLUS, expressed as a yield table.

**Mass Movement** - The downslope movement of earth caused by gravity. Includes but is not limited to landslides, rock falls, debris avalanches, and creep. It does not include surface erosion.

**Matrix Lands** - Federal land outside of reserves and special management areas that will be available for timber harvest at varying levels.

**Mature Seral Stage** - See Seral Stages.

**MICRO\*STORMS** - A micro-computer database system providing background information and recommended treatment for each operations inventory unit.

**Mid Seral Stage** - The period in the life of a forest stand from crown closure to ages 15 - 40. Due to stand density, brush, grass, or herbs rapidly decrease in the stand. Hiding cover may be present.

**Mineral Estate** - The ownership of the minerals at or beneath the surface of the land.

**Mineral Potential Classification System - Method for assessing the potential for the presence of a concentration of one or more energy and/or mineral resources.**

**Mineral Restrictions:**

**Closed Nondiscretionary -** Areas specifically closed to mineral exploration and development by authority of law, regulation, Secretarial decision (including Public Land Orders), or Executive Order.

**Closed Discretionary -** Areas closed to mineral exploration and development by authority or law or regulation, but where such lands can be opened by action of the BLM without legislation, regulation change, Secretarial decision, or Executive Order.

**Open Standard Requirements -** Areas open to mineral exploration and development subject only to requirements over which the BLM has no discretionary control, such as the Clean Air/ Clean Water Acts, National Environmental Policy Act, Resource Conservation and Recovery Act, Coastal Zone Management Act, Endangered Species Act, and the National Historic Preservation Act.

**Open Additional Restrictions -** Areas open to mineral exploration and development, subject to additional restrictions, that can be legally required by the BLM pursuant to law, regulation, or other legal authority, such as ACEC designation, OHV or other closure order, or community pit designation.

**Minimum Harvest Age -** The lowest age of a forest stand to be scheduled for final harvest.

**Minimum Stocking -** Reforestation level lower than target stocking. Does not achieve full site occupancy in young stands but is capable of achieving optimal final harvest yield and reduced commercial thinning yield.

**Minimum Streamflow -** The quantity of water needed to maintain the existing and planned in-place uses of water in or along a stream channel or other water body and to maintain the natural character of the aquatic system and its dependent systems.

**Mining Claims -** Portions of public lands claimed for possession of locatable mineral deposits, by locating and recording under established rules and pursuant to the 1872 Mining Law.

**Mitigating Measures -** Modifications of actions that (a) avoid effects by not taking a certain action or parts of an action; (b) minimize effects by limiting the degree or magnitude of the action and its implementation; (c) rectify effects by repairing, rehabilitating or restoring the affected environment; (d) reduce or eliminate effects over time by preservation and maintenance operations during the life of the action; or (e) compensate for effects by replacing or providing substitute resources or environments.

**Monitoring -** The process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

**Monitoring/Evaluation -** The orderly collection and analysis of data to evaluate the progress and effectiveness of on-the-ground actions in meeting resource management objectives.

**Mortality Salvage -** The harvest of dead and dying timber.

**Multi-aged Stand -** A forest stand that has more than one distinct age class arising from specific disturbance and regeneration events at various times. These stands normally will have multi-layered structure.

**Multi-layered Canopy -** Forest stands with two or more distinct tree layers in the canopy; also called multi-storied stands.

**Multiple Use -** Management of the public lands and their various resource values so that they are used in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.

**Mycorrhizal Fungi** - Fungi with a symbiotic relationship with the roots of certain plants.

**National Ambient Air Quality Standards (NAAQS)** - Standards designed to protect public health and welfare, allowing an adequate margin of safety. For particulate matter less than 10 microns in size ( $PM_{10}$ ), 50 micrograms per cubic meter annual average and 150 micrograms per cubic meter, 24-hour average, not to be exceeded more than once per year.

**National Register of Historic Places** - A formal list established by the National Historic Preservation Act of 1966 of cultural resources worthy of preservation. The Register is maintained by the National Park Service; and lists archaeological, historic, and architectural properties.

**Nonattainment** - Failure of a geographical area to attain or maintain compliance with ambient air quality standards.

**Nonattainment Area** - A geographical area that has failed to attain or maintain compliance with air quality standards. Nonattainment area boundaries are commonly the same as city, standard metropolitan statistical area or county boundaries.

**Nonchargeable Volume** - Timber harvest not included in the allowable sale quantity calculations.

**Noncommercial Forest Land** - Land incapable of yielding at least 20 cubic feet of wood per acre per year of commercial species; or land that is capable of producing only noncommercial tree species.

**Noncommercial Tree Species** - Minor conifer and hardwood species whose yields are not reflected in the commercial conifer forest land allowable sale quantity. Some species may be managed and sold under a suitable woodland allowable sale quantity and, therefore, may be commercial as a woodland species.

**Nonforest Land** - Land developed for nontimber uses or land incapable of being 10 percent stocked with forest trees.

**Nongame Wildlife** - All wild vertebrate and invertebrate animals not subject to sport hunting.

**Nonpoint Source Pollution** - Water pollution that does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition or percolation, and normally is associated with agricultural, silvicultural and urban runoff, runoff from

construction activities, etc. Such pollution results in the human-made or human-induced alteration of the chemical, physical, biological, radiological integrity of water.

**Nonsuitable Commercial Forest Land** - Sites that would take longer than 15 years to meet or exceed minimum stocking levels of commercial species. Further classified as suitable woodland.

**Nonsuitable Woodland** - All fragile nonsuitable forest land.

**Northern Spotted Owl Habitat Sites** - Sites monitored by the BLM for northern spotted owl occupancy during some or all of the years 1985 through 1988, in accordance with the BLM's spotted owl monitoring guidelines. These sites are known to have been inhabited by spotted owls at some time in the last dozen years, but not necessarily during the 1985-1988 period.

**Noxious Plant** - A plant specified by law as being especially undesirable, troublesome, and difficult to control.

**Noxious Weed** - See Noxious Plant.

**Nutrient Cycling** - Circulation or exchange of elements such as nitrogen and carbon between nonliving and living portions of the environment. Includes all mineral and nutrient cycles involving mammals and vegetation.

**Nutrient Depletion** - Detrimental changes on a site in the total amount of nutrients and/or their rates of input, uptake, release, movement, transformation, or export.

**O&C Lands** - Public lands granted to the Oregon and California Railroad Company and subsequently reverted to the United States.

**Objectives** - Expressions of what are the desired end results of management efforts.

**Obligate Species** - A plant or animal that occurs only in a narrowly defined habitat such as tree cavity, rock cave, or wet meadow.

**Off-Highway Vehicle** - Any motorized track or wheeled vehicle designed for cross country travel over natural terrain. The term "Off-Highway Vehicle" will be used in place of the term "Off-Road Vehicle" to comply with the purposes of Executive Orders 11644 and 11989. The definition for both terms is the same.



**Off-Highway Vehicle Designation**

**Open:** Designated areas and trails where off-road vehicles may be operated subject to operating regulations and vehicle standards set forth in BLM Manuals 8341 and 8343.

**Limited:** Designated areas and trails where off-road vehicles are subject to restrictions limiting the number or types of vehicles, date, and time of use; limited to existing or designated roads and trails.

**Closed:** Areas and trails where the use of off-road vehicles is permanently or temporarily prohibited. Emergency use is allowed.

**Old Growth Conifer Stand - Older forests** occurring on western hemlock, mixed conifer, or mixed evergreen sites that differ significantly from younger forests in structure, ecological function, and species composition. Old growth characteristics begin to appear in unmanaged forests at 175-250 years of age. These characteristics include (a) a patchy, multi-layered canopy with trees of several age classes; (b) the presence of large living trees; (c) the presence of larger standing dead trees (snags) and down woody debris, and (d) the presence of species and functional processes which are representative of the potential natural community.

For purposes of inventory, old growth stands on BLM-administered lands are only identified if they are at least ten percent stocked with trees of 200 years or older and are ten acres or more in size. For purposes of habitat or biological diversity, the BLM uses the appropriate minimum and average definitions provided by Pacific Northwest Experiment Station publications 447 and GTR-285. This definition is summarized from the 1986 interim definitions of the Old Growth Definitions Task Group.

**Old Growth Seral Stage - See Seral Stages.**

**Old Growth-Dependent Species - An animal species** so adapted that a portion of its life cycle relies on old growth forest habitat.

**Operations Inventory (OI) - An intensive, site-specific forest inventory** of forest stand location, size, silvicultural needs, and recommended treatment based on individual stand conditions and productivity.

**Operations Inventory Unit - An aggregation of trees** occupying an area that is sufficiently uniform in composition, age, arrangement and condition to be distinguishable from vegetation on adjoining areas.

**Optimal Cover - For elk, cover used to hide from predators and avoid disturbances, including man.** It consists of a forest stand with four layers and an overstory canopy that can intercept and hold a substantial amount of snow, yet has dispersed, small openings. It is generally achieved when the dominant trees average 21 inches dbh or greater and have 70 percent or greater crown closure.

**Outstanding Natural Area (ONA) - An area that** contains unusual natural characteristics and is managed primarily for educational and recreational purposes.

**Outstandingly Remarkable Values (ORVs) - Values** among those listed in Section 1 (b) of the Wild and Scenic Rivers Act: "scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values ..." Other similar values that may be considered include ecological, biological or botanical, paleontological, hydrological, scientific or research.

**Overstory Removal - The final stage of cutting** where the remaining overstory trees are removed to allow the understory to grow. Overstory removal is generally accomplished three to five years after reforestation and when adequate stocking has been achieved.

**Paper and Allied Products - An industrial classification** that includes establishments primarily engaged in the manufacture of pulps from wood and other cellulose fibers, and from rags; the manufacture of paper and paperboard; and the manufacture of paper and paperboard into converted products, such as paper coated off the paper machine, paper bags, paper boxes, and envelopes.

**Partial Cutting - Removal of selected trees** from a forest stand.

**Partial Log Suspension - During yarding operations,** suspension of one end of the log above the ground.

**Particulates - Finely divided solid or liquid (other than water) particles** in the air.

**Peak Flow - The highest amount of stream or river flow** occurring in a year or from a single storm event.

**Perennial Stream - A stream that has running water** on a year-round basis under normal climatic conditions.

**Personal Income - The income received by all individuals in the economy from all sources.** Made up of wages and salaries, proprietors income, rental and the difference between transfer payments (payouts) and personal contributions for social insurance.



**Phenological Cycles** - Periodic phenomena in organisms as they are related to environmental factors. In plants these phenomena include flowering, fruiting, leaf emergence, and leaf fall.

**Plan Amendment** - A change in the terms, conditions or decisions of a resource management plan.

**Plan Maintenance** - Any documented minor change that interprets, clarifies, or refines a decision within a resource management plan but does not change the scope or conditions of that decision.

**Plan Revision** - A new resource management plan prepared by following all steps required by the regulations for preparing an original resource management plan.

**Planning Area** - All of the lands within the BLM management boundary addressed in a BLM resource management plan; however, BLM planning decisions apply only to BLM-administered lands and mineral estate.

**Planning Issue** - See Issue.

**Plant Association** - A plant community type recognized by a grouping of one or more dominant species in each layer of vegetation (typically based on land management potential, successional patterns, and species composition).

**Plant Community** - An association of plants of various species found growing together in different areas with similar site characteristics.

**Plantation Maintenance** - Actions in an unestablished forest stand to promote the survival of desired crop trees.

**Plantation Release** - All activities associated with promoting the dominance and/or growth of desired tree species within an established forest stand.

**Pool/Riffle Ratio** - The ratio of surface area or length of pools to the surface area or length of riffles in a given stream reach; frequently expressed as the relative percentage of each category. Used to describe fish habitat rearing quality.

**Potential ACEC** - An area of BLM-administered land that meets the relevance and importance criteria for ACEC designation, as follows:

- (1) **Relevance.** There shall be present a significant historic, cultural, or scenic value; a fish or wildlife resource or other natural system or process; or natural hazard.

- (2) **Importance.** The above described value, resource, system, process, or hazard shall have substantial significance and values. This generally requires qualities of more than local significance and special worth, consequence, meaning, distinctiveness, or cause for concern. A natural hazard can be important if it is a significant threat to human life or property.

**Potential Natural Community** - The community of plants and wild animals that would become established if all successional sequences were completed without interference by man under present environmental conditions. For forest communities, the potential natural community is an old growth conifer stand.

**Precommercial Thinning** - The practice of removing some of the trees less than merchantable size from a stand so that remaining trees will grow faster.

**Prescribed Fire** - A fire burning under specified conditions that will accomplish certain planned objectives.

**Prevention Strategy(ies)** - The amelioration of conditions that cause or favor the presence of competing or unwanted vegetation.

**Priority Animal Taxa** - Species or subspecies having special significance for management. They include endangered, threatened and special status species; species of high economic or recreation value; and species of significant public interest.

**Priority Habitats** - Aquatic, wetland and riparian habitats, and habitats of priority animal taxa.

**Probable Sale Quantity (PSQ)** - Probable sale quantity estimates the allowable harvest levels for the various alternatives that could be maintained without decline over the long term if the schedule of harvests and regeneration were followed. "Allowable" was changed to "probable" to reflect uncertainty in the calculations for some alternatives. Probable sale quantity is otherwise comparable to allowable sale quantity (ASQ). However, probable sale quantity does not reflect a commitment to a specific cut level. Probable sale quantity includes only scheduled or regulated yields and does not include "other wood" or volume of cull and other products that are not normally part of allowable sale quantity calculations.

**Progeny Test Site** - A test area for evaluating parent seed trees by comparing the growth of their offspring seedlings.

## **Chapter 6 - Glossary, References Cited, and Index**

**Proposed Threatened or Endangered Species** - Plant or animal species proposed by the U.S. Fish & Wildlife Service to be biologically appropriate for listing as threatened or endangered, and published in the Federal Register. It is not a final designation.

**Public Domain Lands** - Original holdings of the United States never granted or conveyed to other jurisdictions, or reacquired by exchange for other public domain lands.

**Public Water System** - A system providing piped water for public consumption. Such a system has at least fifteen service connections or regularly serves at least twenty-five individuals.

**Raptor** - Any of the birds of prey, which includes eagles, hawks, falcons, and owls.

**Rearing Habitat** - Areas in rivers or streams where juvenile salmon and trout find food and shelter to live and grow.

**Recovery Plan** - A plan for the conservation and survival of an endangered species or a threatened species listed under the Endangered Species Act, to improve the status of the species to make continued listing unnecessary.

**Recreational River** - See Wild and Scenic River System.

**Reforestation** - The natural or artificial restocking of an area with forest trees; most commonly used in reference to artificial stocking.

**Regeneration Harvest** - Timber harvest conducted with the partial objective of opening a forest stand to the point where favored tree species will be reestablished.

**Regeneration Period** - The time it takes to reforest an area to adequate stocking following a timber sale.

**Regional Ecosystem Office (REO)** - The main function of this office is to provide staff work and support to the Regional Interagency Executive Committee so the standards and guidelines in the forest management plan can be successfully implemented.

**Regional Interagency Executive Committee (RIEC)** - This group serves as the senior regional entity to assure the prompt, coordinated and successful implementation of the forest management plan standards and guidelines at the regional level.

**Regulated Forest** - A forest that comprises an even distribution of age classes or tree sizes, when the growth equals the cut (at the highest level sustain-

able) and when the level of growing stock remains relatively constant.

**Representative Timber Management Scenario** - A set of assumed timber harvest units, road locations and average annual levels of associated practices and intensive management practices for the decade of the expected life of the plan.

**Research Natural Area (RNA)** - An area that contains natural resource values of scientific interest and is managed primarily for research and educational purposes.

**Reserved Federal Mineral Estate** - Land on which the federal government has ownership of minerals but the surface estate is private or other nonfederal ownership.

**Resource Management Plan (RMP)** - A land use plan prepared by the BLM under current regulations in accordance with the Federal Land Policy and Management Act.

**Responding Effects** - The jobs and income generated by the purchase of goods and services by businesses or employees in the sector (s) being examined. For example: Purchases of legal services by wood products companies and their employees is a responding effect that creates jobs and income for lawyers.

**Restoration and Retention Blocks** - Ecological reserves managed to restore or retain old growth communities and respective plant communities.

**Right-of-Way** - A permit or an easement (document) that authorizes the use of public lands for specified purposes, such as pipelines, roads, telephone lines, electric lines, and reservoirs.

**Riparian Management Area** - An area allocated in the plan primarily to protect the riparian and/or streamside zone.

**Riparian Reserves** - Designated riparian areas found outside Late-Successional Reserves.

**Riparian Zone** - Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables and soils that exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs, and wet meadows.

**Ripping** - The process of breaking up or loosening compacted soil to assure better penetration of roots of young tree seedlings.

**Rotation** - The planned number of years between establishment of a forest stand and its regeneration harvest.

**Rural Interface Areas** - Areas where BLM-administered lands are adjacent to or intermingled with privately owned lands zoned for 1- to 20-acre lots or that already have residential development.

**Salable Minerals** - High volume, low value mineral resources including common varieties of rock, clay, decorative stone, sand, and gravel.

**Scarification** - Mechanical removal of competing vegetation or interfering debris prior to planting.

**Scenic Quality** - The relative worth of a landscape from a visual perception point of view.

**Scenic River** - See Wild and Scenic River System.

**Scribner Short Log** - A log measurement rule constructed from diagrams that shows the number of 1-inch boards that can be drawn in a circle representing the small end of a 16-foot-long log, assumes a 1/4-inch saw kerf groove, makes a liberal allowance for slabs, and disregards log taper.

**Sediment Yield** - The quantity of soil, rock particles, organic matter or other debris transported through a cross-section of stream in a given period of time. Measured in dry weight or by volume. Consists of suspended sediment and bedload.

**Seed Tree Cutting Method** - An even-age reproductive cutting method in which all mature timber from an area is harvested in one entry except for a small number of trees left as a seed source for the harvested area.

**Seed Orchard** - A plantation of clones or seedlings from selected trees; isolated to reduce pollination from outside sources, weeded of undesirables, and cultured for early and abundant production of seed.

**Selection Cutting** - A method of uneven-age management involving the harvesting of single trees from stands (single-tree selection) or in groups (group selection) without harvesting the entire stand at any one time.

**Sensitivity Analysis** - A process of examining specific trade-offs which would result from making changes in single elements of a plan alternative.

**Sensitivity Levels** - Measures (for example, high, medium, and low) of public concern for the maintenance of scenic quality.

**Seral Stages** - The series of relatively transitory plant communities which develop during ecological succession from bare ground to the climax stage. There are five stages:

**Early Seral Stage** - *On the west side:* The period from disturbance to crown closure of conifer stands managed under the current forest management regime. Grass, herbs, or brush are plentiful. *On the east side:* The period from disturbance to the time when perennial bunchgrasses begin to establish in the plant community. This stage will be dominated by annual grasses, undesirable shrubs, and weeds such as cheatgrass, rabbitbrush, and thistles. Forage will be present primarily in the form of annual grasses. Overstory may be present as either juniper or conifer. If juniper is present many immature plants may be evident as a result of the recent disturbance.

**Mid Seral Stage** - *On the west side:* The period in the life of a forest stand from crown closure to first merchantability. Usually ages 15 through 40. Due to stand density, brush, grass, or herbs rapidly decrease in the stand. Hiding cover may be present. *On the east side:* The period from the establishment of less desirable bunchgrasses to the initial establishment of desirable shrubs and bunchgrasses in the plant community. This stage is dominated by intermediate perennial bunchgrasses (Bluegrass species and squirreltail), forbs, and shrubs. Juniper and conifer may be present as overstory, but juniper seedlings will be less evident than during the early seral stage.

**Late Seral Stage** - *On the west side:* The period in the life of a forest stand from first merchantability to culmination of mean annual increment. This is under a regime including commercial thinning, or to 100 years of age, depending on wildlife habitat needs. During this period, stand diversity is minimal, except that conifer mortality rates will be fairly rapid. Hiding and thermal cover may be present. Forage is minimal. *On the east side:* This period is comprised of desirable bunchgrasses, forbs, and shrubs with or without a canopy cover of juniper and/or conifers. Conifer seedlings will be present but there is little or no evidence of juniper seedlings.

**Mature Seral Stage** - *On the west side:* The period in the life of a forest stand from culmination of mean annual increment to an old growth stage or to 200 years. This is a time of gradually increasing stand diversity. Hiding cover, thermal cover, and some

forage may be present. *On the east side:* This period is comprised of desirable bunchgrasses, forbs, and shrubs with or without a canopy cover of juniper and/or conifers. Conifer seedlings will be present but there is little or no evidence of juniper seedlings.

*Old Growth - On the west side:* This stage constitutes the potential plant community capable of existing on a site given the frequency of natural disturbance events. For forest communities, this stage exists from approximately age 200 until when stand replacement occurs and secondary succession begins again. Depending on fire frequency and intensity, old growth forests may have different structures, species composition and age distributions. In forests with longer periods between natural disturbance, the forest structure will be more even-aged at late mature or early old growth stages. *On the east side:* The potential natural community is the plant community in which the species are capable of perpetuating themselves on a site through reproduction, given the frequency of natural disturbance events. For the range land communities, this stage can be reached in 30 to 50 years after disturbance.

*Shelterwood Cutting -* A regeneration method under an even-age silvicultural system. A portion of the mature stand is retained as a source of seed and/or protection during the period of regeneration. The mature stand is removed in two or more cuttings.

*Short-Term -* The period of time during which the RMP will be implemented; assumed to be 10 years.

*Silvicultural Prescription -* A professional plan for controlling the establishment, composition, constitution, and growth of forests.

*Silvicultural System -* A planned sequence of treatments over the entire life of a forest stand needed to meet management objectives.

*Site Class -* A measure of forest site quality, or a site's ability to grow commercial timber. Site classes range from 1 (highest) to 7 (lowest).

*Site Index -* A measure of forest productivity expressed as the height of the tallest trees in a stand at an index age.

*Site Preparation -* Any action taken in conjunction with a reforestation effort (natural or artificial) to create an environment that is favorable for survival of suitable trees during the first growing season. This environment can be created by altering ground cover, soil or microsite conditions, using biological, mechanical, or manual clearing, prescribed burns, herbicides, or a combination of methods.

*Skid Trail -* A pathway created by dragging logs to a landing (gathering point).

*Skyline Yarding -* A cable yarding system using one of the cables to support a carriage from which logs are suspended and then pulled to a landing.

*Slash -* The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging.

*Slope Failure -* See Mass Movement.

*Smoke Management -* Conducting a prescribed fire under suitable fuel moisture and meteorological conditions with firing techniques that keep smoke effects on the environment within designated limits.

*Smoke Management Program -* A program designed to ensure that smoke impacts on air quality from agricultural or forestry burning operations are minimized; that effects do not exceed, or significantly contribute to, violations of air quality standards or visibility protection guidelines; and that necessary open burning can be accomplished to achieve land management goals.

*Smoke Sensitive Area -* An area identified by the Oregon Smoke Management Plan that may be negatively affected by smoke but is not classified as a designated area.

*Snag -* Any standing dead, partially-dead, or defective (cull) tree at least 10 inches in diameter at breast height and at least 6 feet tall. A hard snag is composed primarily of sound wood, generally merchantable. A soft snag is composed primarily of wood in advanced stages of decay and deterioration, generally not merchantable.

*Snag Dependent Species -* Birds and animals dependent on snags for nesting, roosting, or foraging habitat.

*Soil Compaction -* An increase in bulk density (weight per unit volume) and a decrease in soil porosity resulting from applied loads, vibration, or pressure.

*Soil Displacement -* The removal and horizontal movement of soil from one place to another by mechanical forces such as a blade.

*Soil Productivity -* Capacity or suitability of a soil for establishment and growth of a specified crop or plant species, primarily through nutrient availability.

*Soil Series -* A group of soils developed from a particular type of parent material; having naturally developed horizons that, except for texture of the



surface layer, are similar in differentiating characteristics and in arrangement of the profile.

**Special Areas** - Areas that may need special management, which may include management as an area of critical environmental concern, research natural area, outstanding natural area, environmental education area, or other special category.

**Special Forest/Natural Products** - Firewood, shake bolts, mushrooms, ferns, floral greens, berries, mosses, bark, grasses etc., that could be harvested in accordance with the objectives and guidelines in the proposed resource management plan.

**Special Habitat Features** - Habitats of special importance due to their uniqueness or high value.

**Special Recreation Management Area (SRMA)** - An area where a commitment has been to provide specific recreation activity and experience opportunities. These areas usually require a high level of recreation investment and/or management. They include recreation sites but recreation sites alone do not constitute SRMAs.

**Special Status Species** - Plant or animal species falling in any of the following categories (see separate glossary definitions for each):

- ◆ Threatened or Endangered Species
- ◆ Proposed Threatened or Endangered Species
- ◆ Candidate Species
- ◆ State Listed Species
- ◆ Bureau Sensitive Species
- ◆ Bureau Assessment Species

**Species Diversity** - The number, different kinds and relative abundance of species.

**Split Estate** - An area of land where the surface is nonfederally owned and the subsurface mineral resources are federally owned or vice versa.

**Stand (Tree Stand)** - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas.

**Stand Density** - An expression of the number and size of trees on a forest site. May be expressed in terms of numbers of trees per acre, basal area, stand density index, or relative density index.

**State Historic Preservation Officer (SHPO)** - The state official authorized to act as a liaison to the Secretary of the Interior for purposes of implementing the National Historic Preservation Act of 1966.

**State Implementation Plan** - A state document, required by the Clean Air Act. It describes a comprehensive plan of action for achieving specified air quality objectives and standards for a particular

locality or region within a specified time, as enforced by the state and approved by the Environmental Protection Agency.

**State Listed Species** - Plant or animal species listed by the State of Oregon as threatened or endangered pursuant to ORS 496.004, ORS 498.026, or ORS 564.040.

**Statewide Comprehensive Outdoor Recreation Plan (SCORP)** - A plan prepared by the state, that describes and analyzes the organization and function of the outdoor recreation system of the state. The plan provides an analysis of the roles and responsibilities of major outdoor recreation suppliers; an analysis of demand, supply and needs; issue discussions; an action program to address the issues; and a project selection process.

**Stocked/Stocking** - Related to the number and spacing of trees in a forest stand.

**Strategic and Critical Minerals** - Minerals that supply military, industrial and essential civilian needs of the United States during a national defense emergency. They are not found or produced in this country in sufficient quantities to meet such needs. Nickel, cobalt, and chromium are examples of such minerals occurring in western Oregon.

**Stream Class** - A system of stream classification established in the Oregon Forest Practices Act. Class I streams are those that are significant for: 1) domestic use, 2) angling, 3) water dependent recreation, and 4) spawning, rearing or migration of anadromous or game fish. All other streams are Class II. Class II special protection streams (Class II SP) are Class II streams which have a significant summertime cooling influence on downstream Class I waters which are at or near a temperature at which production of anadromous or game fish is limited.

**Stream Order** - A hydrologic system of stream classification based on stream branching. Each small unbranched tributary is a first order stream. Two first order streams join to make a second order stream. Two second order streams join to form a third order stream and so forth.



**Stream Reach** - An individual first order stream or a segment of another stream that has beginning and ending points at a stream confluence. Reach end points are normally designated where a tributary confluence changes the channel character or order. Although reaches identified by BLM are variable in length, they normally have a range of 1/2 to 1-1/2 miles in length unless channel character, confluence distribution, or management considerations require variance.

**Structural Diversity** - Variety in a forest stand that results from layering or tiering of the canopy and the die-back, death and ultimate decay of trees. In aquatic habitats, the presence of a variety of structural features, such as logs and boulders, that create a variety of habitat.

**Succession** - A series of dynamic changes by which one group of organisms succeeds another through stages leading to potential natural community or climax. An example is the development of series of plant communities (called seral stages) following a major disturbance.

**Suitable Commercial Forest Land** - Commercial forest land capable of sustained long-term timber production.

**Suitable River** - A river segment found, through administrative study by an appropriate agency, to meet the criteria for designation as a component of the National Wild and Scenic Rivers system, specified in Section 4(a) of the Wild and Scenic Rivers Act,

**Suitable Woodland** - Forest land occupied by minor conifer and hardwood species not considered in the commercial forest land allowable sale quantity determination and referred to as noncommercial species. These species may be considered commercial for fuelwood, etc. under woodland management. Also included are low site and nonsuitable commercial forest land. These lands must be biologically and environmentally capable of supporting a sustained yield of forest products.

**Surface Erosion** - The detachment and transport of soil particles by wind, water, or gravity. Surface erosion can occur as the loss of soil in a uniform layer (sheet erosion), in many rills, or by dry ravel.

**Suspended Sediment** - Sediment suspended in a fluid by the upward components of turbulent currents or by colloidal suspension.

**Sustained Yield** - The yield that a forest can produce continuously at a given intensity of management.

**Sustained Yield Unit (SYU)** - An administrative division for which an allowable sale quantity is calculated.

**Target Stocking** - The desirable number of well-spaced trees per acre at age of first commercial thinning.

**Ten Percent Stocked** - Stocking of tree seedlings and saplings (0.5 inches in diameter 4.5 feet above the ground) that are well distributed over the land and are more than 30 per acre in number. Or the stocking of trees larger than 5 inches in diameter with foliage that covers at least 10 percent of the land surface area.

**Texture (soil)** - The relative proportion of sand, silt, and clay in a soil; grouped into standard classes and subclasses in the USDA Soil Survey Manual.

**Thermal Cover** - Cover used by animals to lessen the effects of weather. For elk, a stand of conifer trees that are 40 feet or more tall with an average crown closure of 70 percent or more. For deer, cover may include saplings, shrubs or trees at least 5 feet tall with 75 percent crown closure.

**Threatened Species** - Any species defined through the Endangered Species Act as likely to become endangered within the foreseeable future throughout all or a significant portion of its range and published in the Federal Register.

**Timber Management Plan** - An activity plan that specifically addresses procedures related to the offering and sale of timber volume consistent with the approved allowable sale quantity.

**Timber Production Capability Classification (TPCC)** - The process of partitioning forest land into major classes indicating relative suitability to produce timber on a sustained yield basis.

**Total Suspended Particulates** - All solid or semi-solid material found in the atmosphere.

**Traditional Use Areas** - This area of cultural resource management concerns itself with those locations formerly, and in some cases continuously, used in subsistence hunting and gathering activities and religious practices; such as vision quest sites, dance circles, and prayer circles. However the traditional use category is not limited exclusively to these areas. Size of these localities may vary from a single stone cairn to many acres. Types of areas range from wetlands and riparian areas to rocky outcroppings, mountain ledges, meadows and forested lands. There may or may not be physical evidence of this use visible on the earth surface. An example would

be in root crop gathering areas where during drought conditions, the roots lay dormant, and do not sprout sometimes for years, until there has been adequate precipitation to support the crop.

Transportation System - Network of roads used to manage BLM-administered lands. Includes BLM controlled roads and some privately controlled roads. Does not include Oregon Department of Transportation, county, and municipal roads.

Travel Corridor - A route used by animals along a belt or band of suitable cover or habitat.

Treatable Water - Water capable of being processed with commonly used filtration and chlorination systems.

Understocked - The condition when a plantation of trees fails to meet the minimum requirements for number of well spaced trees per acre.

Uneven-Aged Management - A combination of actions that simultaneously maintains continuous tall forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

Unique Ecosystems - Ecosystems embracing special habitat features, such as beaches and dunes, talus slopes, meadows, and wetlands.

Unnecessary or Undue Degradation - Surface disturbance greater than what would normally result when a mineral exploration or development activity regulated under 43 CFR 3809 is being accomplished by a prudent operator in usual, customary and proficient operations of similar character and taking into consideration the effects of operations on other resources and land uses, outside the area of operations. Failure to initiate and complete reasonable mitigation measures, including reclamation of disturbed areas; or failure to prevent the creation of a nuisance, which may constitute unnecessary or undue degradation. Failure to comply with applicable environmental protection statutes and regulations thereunder will constitute unnecessary or undue degradation.

Utility Corridor - A linear strip of land identified for the present or future location of utility lines within its boundaries.

Viable Population - A wildlife or plant population that contains an adequate number of reproductive individuals to appropriately ensure the long-term existence of the species.

Viewshed - The landscape that can be directly seen from a viewpoint or along a transportation corridor.

Visibility Protection Plan - A plan that implements the requirements of the Clean Air Act by establishing programs for visibility monitoring; short- and long-term control strategies; and procedures for program review, coordination, and consultation.

Visual Resources - The visible physical features of a landscape.

Visual Resource Management (VRM) - The inventory and planning actions to identify visual values and establish objectives for managing those values and the management actions to achieve visual management objectives.

Visual Resource Management Classes - Categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes. Each class has an objective that prescribes the amount of modification allowed in the landscape.

Water Quality - The chemical, physical, and biological characteristics of water.

Water Yield - The quantity of water derived from a unit area of watershed.

Western Oregon Digital Database (WODDB) - A very high resolution (1 inch = 400 feet) geographic digital (computer) database derived from aerial photography for BLM lands in western Oregon.

Wetlands or Wetland Habitat - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for live in saturated soil conditions. Wetlands generally include, but are not limited to, swamps, marshes, bogs, and similar areas.

Wet Meadows - Areas where grasses predominate. Normally waterlogged within a few inches of the ground surface.

Wild and Scenic River System - A national system of rivers or river segments that have been designated by Congress and the President as part of the National Wild and Scenic Rivers System (Public Law 90-542, 1968). Each designated river is classified as one of the following:

**Wild River** - A river or section of a river free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. Designated wild as part of the National Wild and Scenic Rivers System.

**Scenic River** - A river or section of a river free of impoundments, with shorelines or watersheds still largely primitive and undeveloped but accessible in places by roads. Designated scenic as part of the National Wild and Scenic Rivers System.

**Recreational River** - A river or section of a river readily accessible by road or railroad, that may have some development along its shorelines, and that may have undergone some impoundment or diversion in the past. Designated recreational as part of the National Wild and Scenic Rivers System.

**Wilderness Study Area (WSA)** - A roadless area inventoried and found to be wilderness in character, having few human developments and providing outstanding opportunities for solitude and primitive recreation, as described in Section 603 of the Federal Land Policy and Management Act and in Section 2(c) of the Wilderness Act of 1964.

**Wildlife Tree** - A live tree retained to become future snag habitat.

**Wild River** - See Wild and Scenic River System

**Windthrow** - A tree or trees uprooted or felled by the wind.

**Withdrawal** - A designation which restricts or closes public lands from the operation of land or mineral disposal laws.

**Woodland** - Forest land producing trees not typically used as saw timber products and not included in calculation of the commercial forest land PSQ.

**Woody Debris** - See large woody debris.

**Yarding** - The act or process of moving logs to a landing.

**Yield Table** - A table of timber volumes expected to be produced under a certain set of conditions.

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# Index

Access .....	2-63, 133, 142, 146, 150, 158, 164, 170
Adaptive management .....	2-173
Air quality .....	2-24, 177; 3-5; 4-8
American Indian(s) .....	2-39; 4-93
Analytical watershed .....	3-12, 14; 4-22
Aquatic conservation strategy .....	2-2, 4; 4-24
Area of critical environmental concern (ACEC) .....	2-37, 38; 3-48; 4-92, 93, 94
Back country byway .....	(see National Back Country Byway)
Best management practices .....	2-24, 2-26; 4-11, 14, 15, 16
Biological diversity .....	3-21; 4-24
Budget .....	2-178, 179; 4-4
Commercial forest land .....	3-60; 4-109
Communication sites .....	2-65
Community stability .....	3-75; 4-127
Connectivity/diversity .....	2-18, 22; 4-28, 29
Consistency .....	4-141
Consultation/coordination .....	1-5; 2-69, 172; 4-142
Corridor (right-of-way) .....	3-4
Critical habitat .....	4-78
Cultural resources .....	2-39, 130, 141, 150, 157, 164, 170; 3-48; 4-93, 115
Cumulative effects .....	2-23, 25, 117; 4-127
District designated reserves .....	(see Late-successional/district designated reserves)
Dominant woodpeckers .....	3-39; 4-62, 88
Ecological health .....	3-63, 66; 4-32
Ecological principles .....	Summary-8; 2-3
Employment .....	3-68, 69, 70; 4-124, 125, 126, 128
Endangered species .....	(see Threatened and endangered species)
Energy .....	2-55, 133, 142, 151, 159, 165; 3-67; 4-118
Fire/fuels management .....	2-17, 70, 136, 143, 151, 159, 165, 171; 3-8, 79; 4-8, 26, 32, 115, 139
Fish .....	2-31; 3-41; 4-89
Flood plains .....	2-25; 4-42
Forage .....	2-30; 3-79; 4-137
Forest Health .....	2-49
General Forest Management Area .....	(see Matrix)
Genetically selected stock .....	4-112
Green trees .....	2-19, 23, 29, 52
Groundwater .....	3-16
Habitat diversity .....	2-121, 138, 147, 152, 160, 166; 4-26, 45
Hazardous materials .....	2-69, 136, 143, 151, 159, 165, 171
Herbicides .....	1-5, 1-7; 2-51, 117, 122
Hydropower .....	2-132, 142, 150, 158, 164, 170; 3-5, 18; 4-6, 51, 92, 100, 103
Irreversible/irretrievable commitment of resources .....	4-3, 70
Issues .....	1-6, 1-7
Jobs .....	(see Employment)
Key watershed .....	2-4, 68; 3-15
Landscape diversity .....	3-24; 4-29
Land tenure .....	2-13, 17, 60, 131, 142, 150, 158, 164, 170; 3-4; 4-115
Land use allocation .....	2-6, 8; 4-108
Late-successional/district designated reserves .....	2-2, 14, 29, 33, 37, 49, 59, 62, 68, 72; 4-74
Livestock (grazing) .....	2-13, 58, 132; 3-66, 76; 4-26, 36, 115, 135
Matrix .....	2-18, 19, 22, 29, 30, 51, 72
Minerals .....	2-11, 22, 55, 133, 142, 151, 159, 165; 3-67; 4-115, 118, 132

# Chapter 6 - Glossary, References Cited, and Index

Mining .....	2-10, 54; 3-67; 4-115
Mitigation .....	4-6
Monitoring .....	2-3, 172, 179
National Back Country Byway .....	2-49; 3-52
Native American .....	3-48; 4-102
Northern spotted owl .....	2-34; 3-45; 4-70, 80
Noxious plant/weed .....	1-5; 2-68, 136, 143, 151, 159, 165, 171, 177; 3-25; 4-35
Off-highway vehicles .....	2-48; 3-53; 4-94, 105
Old growth .....	2-121, 138, 147, 152, 160, 166; 3-25, 30; 4-30, 46
Pacific yew .....	1-5; 3-26
Planning criteria .....	1-6; 5-3
Probable sale quantity .....	4-4, 5, 13
Public water system .....	3-12
Public involvement .....	1-3; 2-178
Range management .....	(see Livestock grazing)
Recovery plan .....	2-34; 3-46; 4-81
Recreation .....	2-11, 44, 128, 140, 149, 156, 162, 168; 3-52; 4-104, 124
Reforestation .....	2-122; 4-5, 112, 113
Research .....	2-178
Research Natural Area .....	2-37, 38; 3-49; 4-91
Rights-of-way .....	2-17, 61, 132, 142, 150, 158, 164, 170; 3-4; 4-6
Riparian reserves .....	2-4, 8, 29, 32, 59, 62, 67, 91; 4-110
Riparian-wetland areas .....	2-18, 137, 143, 147, 152, 160, 166; 3-31; 4-40
Road(s) .....	2-9, 16, 64, 135, 143, 151, 159, 165, 171; 3-6; 4-111
Rural interface areas .....	2-42, 134, 142, 151, 159, 165, 171; 3-76; 4-132
Salvage .....	2-15; 4-115, 140
Scenic resources .....	(see Visual resources)
Sensitive species .....	3-37, 43, 45
Sensitivity analysis .....	4-4
Smoke management .....	2-177; 3-7; 4-9
Snags .....	2-19, 21, 23, 28, 52; 3-40,
Soil(s) .....	2-26; 3-10; 4-11, 17
Special forest/natural products .....	2-18, 53; 3-30; 4-39, 124
Special habitats .....	2-30, 2-52; 3-41; 4-37, 48, 49
Spotted owl .....	(see Northern spotted owl)
State-listed species .....	2-33; 3-43
Suitable habitat .....	4-71, 72, 73, 74
SEIS special attention species .....	2-33, 36; 3-41, 42, 47; 4-67, 87
Thinning .....	2-20; 4-33, 114
Threatened and endangered species .....	2-34, 125, 139, 148, 155, 161, 167; 3-41, 44; 4-67, 70
Timber production capability classification (TPCC) .....	3-10, 58, 59; 4-108
Unavoidable adverse effects .....	4-3
Unique ecosystem .....	(see Special habitats)
Vegetation .....	3-25; 4-35
Visual resources .....	2-40, 128; 3-50; 4-97
Watershed analysis .....	2-5, 175; 3-15
Watershed restoration .....	2-5, 14; 3-11, 36
Water quality .....	2-24, 118, 137, 143, 147, 152, 160, 166; 3-11, 16, 18; 4-16, 18-21
Water rights .....	3-4, 20
Water yield .....	4-17
Wild and scenic river(s) .....	2-41, 129, 141, 149, 157, 163, 169; 3-50; 4-100
Wild horses .....	2-59, 126, 135, 139, 143, 151, 159, 165, 171; 3-78; 4-137
Wildlife .....	2-27, 84, 126, 1444, 149, 155, 161, 167; 3-37; 4-44
Woody debris .....	2-16, 19, 21, 52, 118; 4-49
Yew .....	(see Pacific yew)

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